

# 1.0 EXECUTIVE SUMMARY

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MOSTARDI PLATT conducted compliance test programs on the filterable particulate matter continuous parameter monitoring system (CPMS) on the Wet Gas Scrubber and total particulate matter on the Kiln 19 Indirect Firing Baghouse for Holcim (US) Inc. d/b/a Lafarge Alpena at the Alpena Cement Plant in Alpena, Michigan. This report summarizes the results of the test program and test methods.

The test locations, test dates, and test parameter are summarized below.

TEST INFORMATION		
Test Locations	Test Dates	Test Parameter
Wet Gas Scrubber (WGS) Stack	September 21, 2021	Filterable Particulate Matter (FPM)
Kiln 19 Indirect Firing Baghouse	September 20, 2021	Filterable Particulate Matter (FPM) Total Particulate Matter (TPM)

The purpose of the test program was to demonstrate compliance with Title 40, *Code of Federal Regulations*, Part 60 (40CFR60), and 40CFR63, Subpart LLL "National Emission Standards for Hazardous Air Pollutants (NESHAP) for the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants." Specifically, to demonstrate that each of the below listed sources meet their FPM (and <PM10, as applicable) emission limit and to establish a site-specific operating limit (SSOL) for the Wet Gas Scrubber CPMS.

Test Location	Parameter	Test Result	Emission Limit	CPMS SSOL
WGS Stack	FPM	0.033 lb/ton	0.07 lb/ton	6.12

Test Location	Parameter	Test Result	Emission Limit
Kiln 19 Indirect Firing Baghouse	FPM	0.029 lb/1,000 lb exhaust gas, dry	0.15 lb/1,000 lb exhaust gas, dry
Kiln 19 Indirect Firing Baghouse	TPM*	1.8 lb/hr	1.8 lb/hr

\*All TPM is considered to be <PM10

The identifications of the individuals associated with the test program are summarized below.

TEST PERSONNEL INFORMATION		
Location	Address	Contact
Test Facility	Holcim (US) Inc. Alpena Plant 1435 Ford Avenue Alpena, MI 49707	Mr. Travis Weide Area Environmental & Public Affairs Manager 989-358-3321 travis.weide@lafargeholcim.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Chris Trezak Project Manager 630-993-2100 (phone) ctrezak@mp-mail.com



The test crew consisted of Messrs. E. Ehlers, R. Spoolstra, C. Reice, M. Friduss, N. Colangelo, and C. Trezak.

## 2.0 TEST METHODOLOGY

Emission testing was conducted following the United States Environmental Protection Agency (USEPA) methods specified in 40CFR60, Appendix A in addition the Mostardi Platt Quality Manual. Schematics of the test section diagrams and sampling trains used are included in Appendix A and B respectively. Calculation nomenclature are included in Appendix C. Laboratory analysis for each test run are included in Appendix D. The computerized reference method test data is included in Appendix E. CEM data and process data as provided by Holcim (US) Inc. are also included in Appendix F.

The following methodologies were used during the test program:

### Method 1 Sample and Velocity Traverse Determination

Test measurement points were selected in accordance with USEPA Method 1, 40CFR60, Appendix A. The characteristics of the measurement location are summarized below.

TEST POINT INFORMATION							
Test Location	Stack Dimensions	No. of Ports	Port Length (Inches)	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
WGS Stack	12 Feet	2	5	6.0	4.5	FPM	24
Kiln 19 Indirect Firing Baghouse	2.25 Feet	2	6	6.2	9.8	TPM	12

### Method 2 Volumetric Flow Rate Determination

Gas velocity was measured following USEPA Method 2, 40CFR60, Appendix A, for purposes of calculating stack gas volumetric flow rate and particulate emission rates on a lb/hr basis. S-type pitot tubes, 0-10" differential pressure gauge, and K-type thermocouple and temperature readout were used to determine gas velocity at each sample point. All of the equipment used was calibrated in accordance with the specifications of the Method. Copies of field data sheets are included in Appendix G. Calibration data are presented in Appendix H. This testing met the performance specifications as outlined in the Method.

### Method 3A Oxygen (O<sub>2</sub>)/Carbon Dioxide (CO<sub>2</sub>) Determination

Flue gas O<sub>2</sub> and CO<sub>2</sub> concentrations for the Wet Gas Scrubber Stack were determined in accordance with USEPA Method 3A. An ECOM analyzer was used to determine the O<sub>2</sub> and CO<sub>2</sub> concentrations by connecting the analyzer to the exit of the dry gas meter. The O<sub>2</sub> instrument operates in the nominal range of 0% to 25% with the specific range determined by the high-level calibration gas. The CO<sub>2</sub> instrument operates in the nominal range of 0% to 20% with the specific range determined by the high-level calibration gas. High and mid-range calibrations were performed using USEPA Protocol gas. Zero nitrogen (a low ppm pollutant in balance nitrogen calibration gases) was introduced during other instrument calibrations to check instrument zero. Zero and mid-range calibrations were performed using USEPA Protocol gas after each test run.

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OCT 18 2021



Calibration data is provided in Appendix H. Copies of the gas cylinder certifications are found in Appendix I. The Kiln 19 Baghouse testing was considered to be ambient, per section 8.6 of USEPA Method 2, and therefore a dry molecular weight of 29.0 was used at this location.

### **Method 5 Filterable Particulate Matter (FPM) Determination**

Particulate matter was sampled in accordance with USEPA Method 5, 40CFR60, Appendix A. The particulate matter sampling train was manufactured by Environmental Supply Corporation and meets all specifications required by Method 5. Velocity pressures were determined simultaneously during sampling with an S-type pitot tube and inclined manometer. All temperatures will be measured using K-type thermocouples with calibrated digital temperature indicators. The probe and filter temperatures were maintained at 248°F  $\pm$  25°F throughout sampling.

The filter media are high purity quartz that meet all requirements of Method 5. All sample contact surfaces of the train were washed with HPLC reagent-grade acetone. These washes were placed in sealed and marked containers for analysis.

All sample recoveries were performed at the test site by the test crew. All final particulate sample analyses were performed by Mostardi Platt personnel at the laboratory in Elmhurst, Illinois.

Laboratory analysis data are found in Appendix D. Calibration data are presented in Appendix H.

### **Method 202 Condensable Particulate Determination**

Stack gas condensable particulate matter concentrations and emission rates were determined in accordance with USEPA Method 202, in conjunction with Method 5 filterable particulate sampling at the Kiln 19 Indirect Firing Baghouse. This method applies to the determination of CPM emissions from stationary sources. It is intended to represent condensable matter as material that condenses after passing through a filter and as measured by this method.

The CPM was collected in impingers after filterable particulate material was collected using Method 202. Compared to the December 17, 1991 promulgated Method 202, this Method includes the addition of a condenser, followed by a water dropout impinger immediately after the final heated filter. One modified Greenburg Smith impinger and an ambient temperature filter follow the water dropout impinger.

CPM was collected in the water dropout, modified Greenburg Smith impinger and ambient filter portion of the sampling train as described in this Method. The impinger contents were purged with nitrogen (N<sub>2</sub>) immediately after sample collection to remove dissolved sulfur dioxide (SO<sub>2</sub>) gases from the impingers. The impinger solution was then extracted with deionized water and hexane. The organic and aqueous fractions were dried and the residues weighed. The total of the aqueous, organic, and ambient filter fractions represents the CPM.

All sample recovery was performed at the test site by the test crew. Mostardi Platt personnel at the laboratory in Elmhurst, Illinois, performed all final particulate sample analyses. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.



### 3.0 TEST RESULT SUMMARIES

**Client:** Holcim (US) Inc.  
**Facility:** Alpena Cement Plant  
**Test Location:** Wet Scrubber Stack  
**Test Method:** 5

Source Condition	Normal	Normal	Normal	
Date	9/21/21	9/21/21	9/21/21	
Start Time	13:30	15:50	17:52	
End Time	14:36	16:55	18:57	
	Run 1	Run 2	Run 3	Average
<b>Stack Conditions</b>				
Average Gas Temperature, °F	117.1	116.8	116.5	116.8
Flue Gas Moisture, percent by volume	10.9%	10.8%	10.7%	10.8%
Average Flue Pressure, in. Hg	29.22	29.22	29.22	29.22
Gas Sample Volume, dscf	50.226	52.225	54.39	52.280
Average Gas Velocity, ft/sec	67.236	72.997	70.963	70.399
Gas Volumetric Flow Rate, acfm	456,254	495,346	481,541	477,714
Gas Volumetric Flow Rate, dscfm	363,224	395,016	384,604	380,948
Gas Volumetric Flow Rate, scfm	407,659	442,843	430,688	427,063
Average %CO <sub>2</sub> by volume, dry basis	14.0	14.1	14.0	14.0
Average %O <sub>2</sub> by volume, dry basis	11.4	11.3	11.4	11.4
Isokinetic Variance	98.8	94.5	101.0	98.1
Clinker Production Rate, ton/hr	139.7	144.4	146.7	143.6
CPMS Response, mA	5.50	5.08	5.37	5.32
<b>Filterable Particulate Matter (Method 5)</b>				
grams collected	0.00525	0.00411	0.00526	0.00487
grains/acf	0.0013	0.0010	0.0012	0.0012
grains/dscf	0.0016	0.0012	0.0015	0.0014
lb/hr	5.021	4.111	4.919	4.684
lb/1000 lb of stack gas	0.003	0.002	0.003	0.003
lb/ton of clinker	0.036	0.028	0.034	0.033
<b>Site Specific Operating Limit (SSOL) Determination</b>				
Source Emissions Limit, lb/ton			0.07	
CPMS Zero, mA			4.00	
Filterable Particulate Matter, % of Emissions Limit			46.6%	
SSOL			6.12	



Client: Holcim (US) Inc.  
 Facility: Alpena Cement Plant  
 Test Location: Kiln 19 Indirect Firing Baghouse  
 Test Method: 5/202

	Source Condition	Normal	Normal	Normal	
	Date	9/20/21	9/20/21	9/20/21	
	Start Time	9:35	11:11	12:38	
	End Time	10:39	12:15	13:42	
		Run 1	Run 2	Run 3	Average
<b>Stack Conditions</b>					
Average Gas Temperature, °F		159.8	157.7	160.4	159.3
Flue Gas Moisture, percent by volume		4.7%	4.4%	4.0%	4.4%
Average Flue Pressure, in. Hg		29.24	29.24	29.24	29.24
Gas Sample Volume, dscf		39.364	38.600	38.980	38.981
Average Gas Velocity, ft/sec		75.124	73.427	74.972	74.508
Gas Volumetric Flow Rate, acfm		17,922	17,517	17,886	17,775
Gas Volumetric Flow Rate, dscfm		14,228	13,989	14,282	14,166
Gas Volumetric Flow Rate, scfm		14,922	14,634	14,876	14,811
Isokinetic Variance		103.8	103.5	102.4	103.2
<b>Filterable Particulate Matter (Method 5)</b>					
grams collected		0.03382	0.03673	0.03534	0.03530
grains/acf		0.0105	0.0117	0.0112	0.0111
grains/dscf		0.0133	0.0147	0.0140	0.0140
lb/hr		1.6	1.8	1.7	1.7
lb/1000 lb of stack gas		0.03	0.03	0.03	0.03
<b>Condensable Particulate Matter (Method 202)</b>					
grams collected		0.00237	0.00394	0.00231	0.00287
grains/acf		0.0007	0.0013	0.0007	0.0009
grains/dscf		0.0009	0.0016	0.0009	0.0011
lb/hr		0.1	0.2	0.1	0.1
<b>Total Particulate Matter (5/202)</b>					
grams collected		0.03619	0.04067	0.03765	0.03817
grains/acf		0.0112	0.0130	0.0119	0.0120
grains/dscf		0.0142	0.0163	0.0149	0.0151
lb/hr		1.7	2.0	1.8	1.8
lb/1000 lb of stack gas		0.027	0.030	0.028	0.029

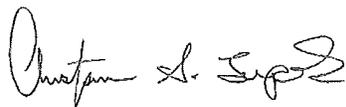


## 4.0 CERTIFICATION

MOSTARDI PLATT is pleased to have been of service to Holcim (US) Inc. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

As the program manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results. The test program was performed in accordance with the test methods and the Mostardi Platt Quality Manual, as applicable.

MOSTARDI PLATT



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Christopher S. Trezak

Project Manager



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Eric L. Ehlers

Quality Assurance



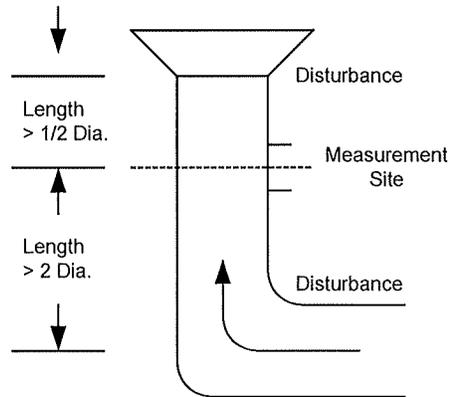
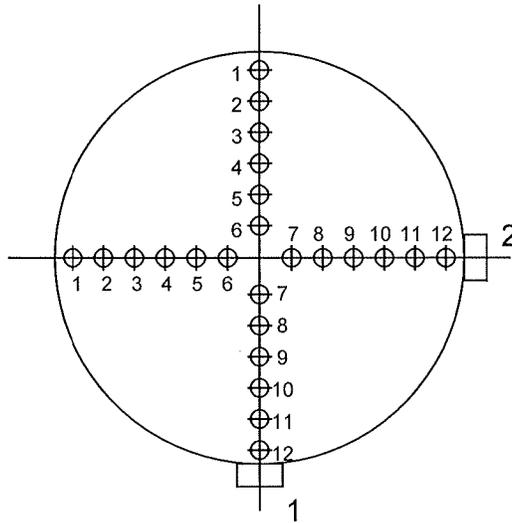
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# APPENDICES



## Appendix A - Test Section Diagrams

## EQUAL AREA TRAVERSE FOR ROUND DUCTS (Particulate Matter)



Job: Holcim (US) Inc.  
Alpena Cement Plant

Date: September 21, 2021

Test Location: Wet Gas Scrubber Stack

Duct Diameter: 12 Feet

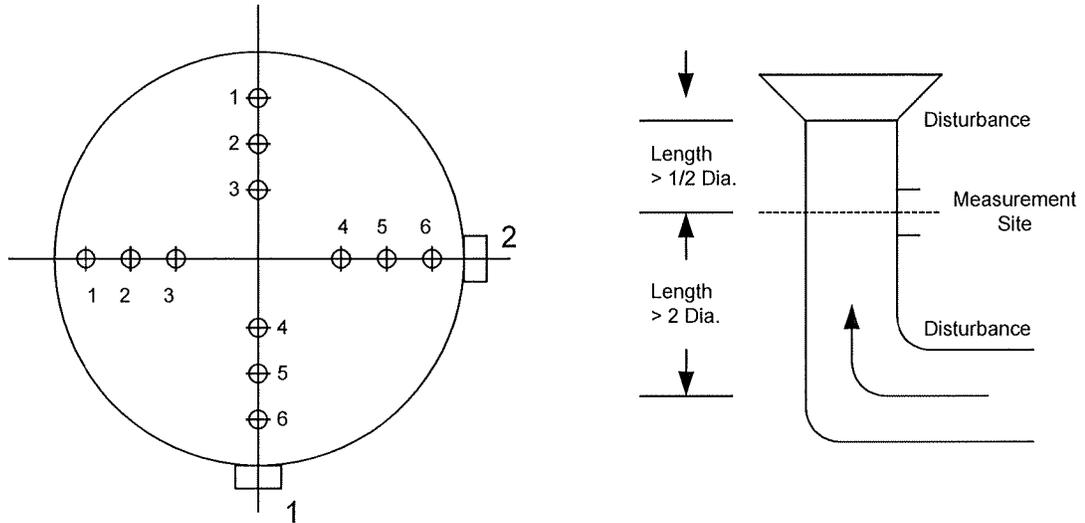
Duct Area: 113.097 Square Feet

No. Points Across Diameter: 24

No. of Ports: 2

Port Length: 5 Inches

## EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: Holcim (US) Inc.  
Alpena Cement Plant

Date: September 20, 2021

Test Location: Kiln 19 Indirect Firing Baghouse

Duct Diameter: 2.25 Feet

Duct Area: 3.976 Square Feet

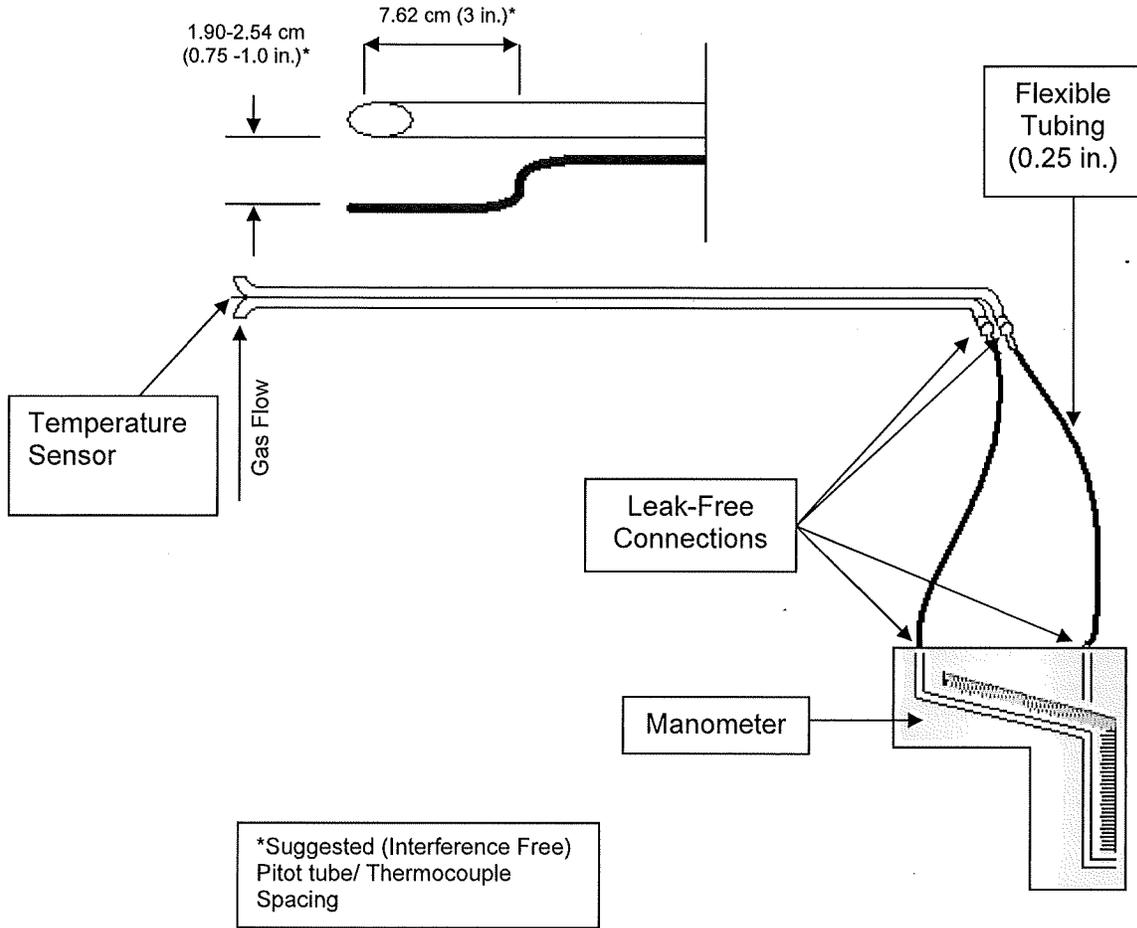
No. Points Across Diameter: 12

No. of Ports: 2

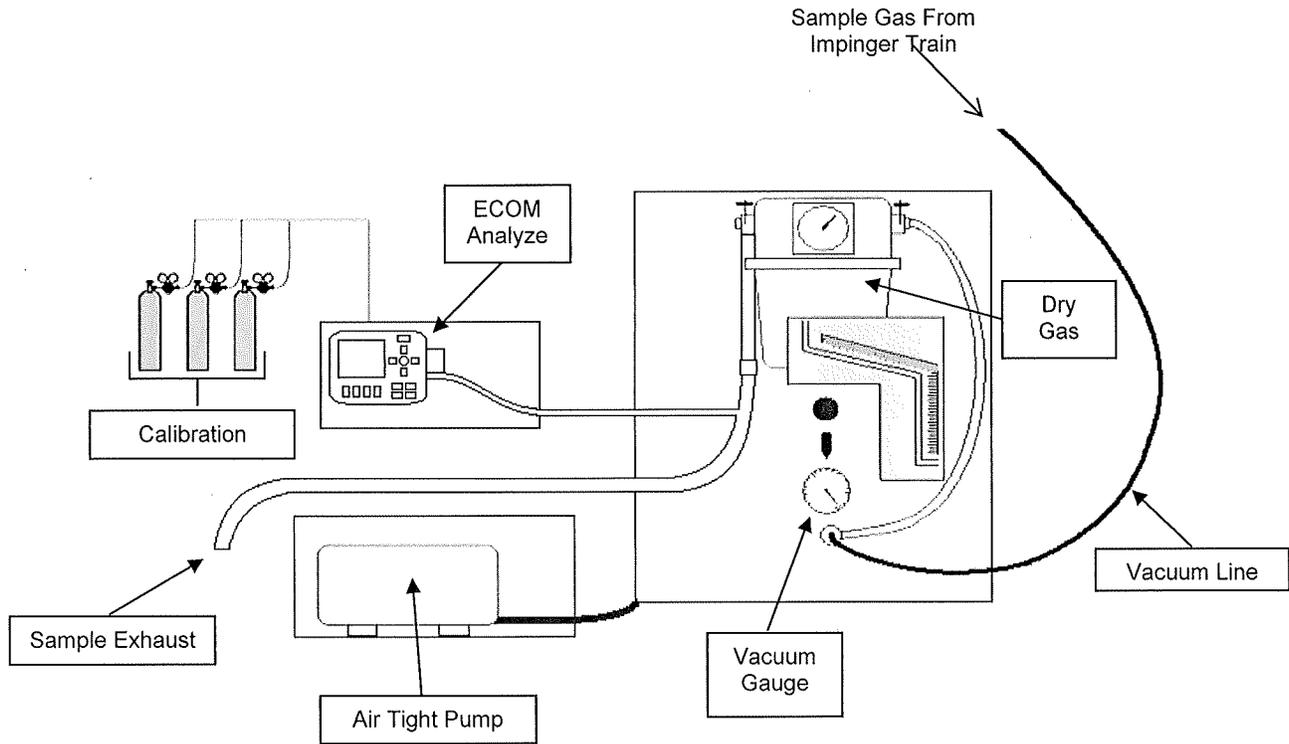
Port Length: 6

## Appendix B - Sample Train Diagrams

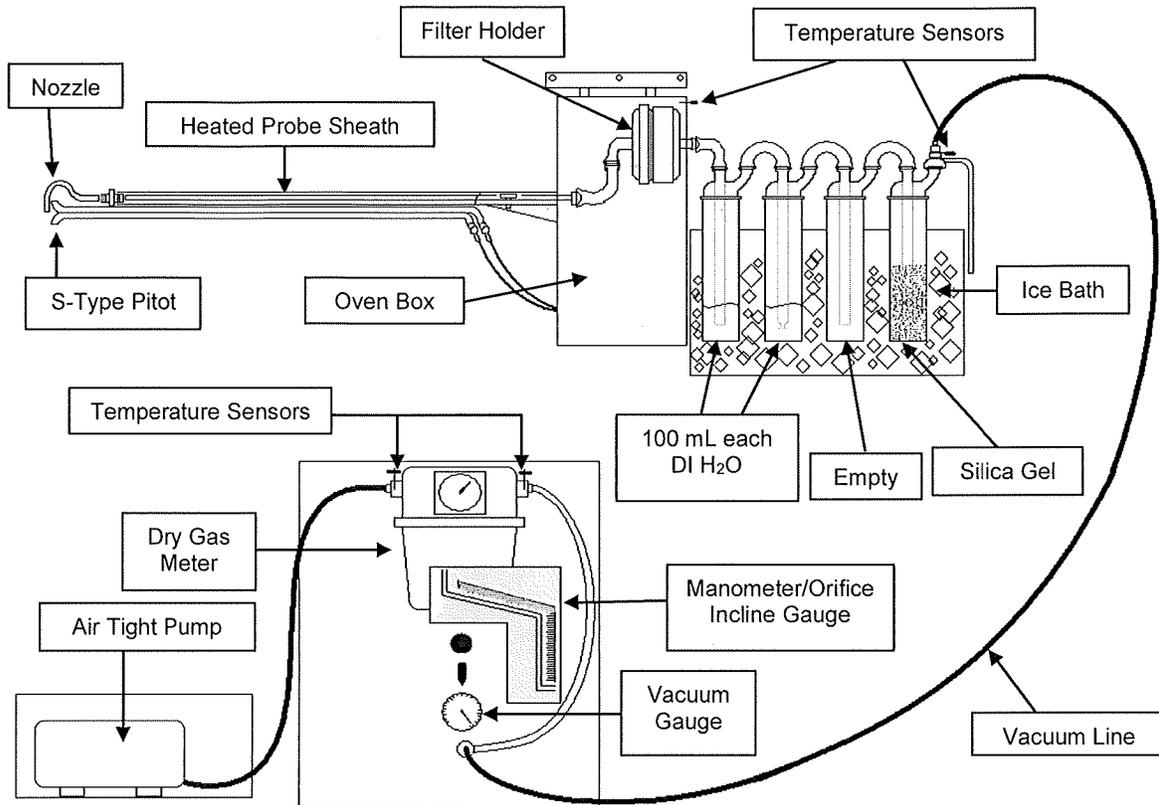
# USEPA Method 2 – Type S Pitot Tube Manometer Assembly



# USEPA Method 3A - Integrated Oxygen/Carbon Dioxide Sample Train Diagram Utilizing ECOM To Measure from Sample Exhaust



## USEPA Method 5- Particulate Matter Sample Train Diagram



# USEPA Method 5/202- Filterable/Condensable Particulate Matter

