

1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a compliance test program 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
Kiln 19 Breaching Duct	September 9, 2020	Filterable Particulate Matter (FPM)
Clinker Coolers 22 and 23 Stacks	September 14, 2020	
Wet Gas Scrubber (WGS) Stack	September 12, 2020	

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 emission limit and to establish a site-specific operating limit (SSOL) for each emission point's continuous parameter monitoring system (CPMS).

Test Location	Parameter	Emission Rate	Emission Limit	CPMS SSOL
Kiln 19 Breaching Duct	FPM	0.012 lb/ton	0.07 lb/ton	4.64
Clinker Cooler 22	FPM	0.012 lb/ton	0.07 lb/ton	4.56
Clinker Cooler 23	FPM	0.026 lb/ton	0.07 lb/ton	4.68
WGS Stack	FPM	0.051 lb/ton	0.07 lb/ton	5.02

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. Eric Ehlers Senior Project Manager 630-993-2100 (phone) eehlers@mp-mail.com

The test crew consisted of Messrs. D. Kossack, R. Spoolstra, C. Reice, K. West, W. Petrovich, and E. Ehlers.

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
Kiln 19 Breaching Duct	8' x 9.91667'	3	3	>0.5	>2.0	FPM	27
Clinker Cooler 22 and 23 Stacks (Identical)	85" x 66"	4	4.25	>0.5	>2.0	FPM	24
WGS Stack	144"	2	5	6.0	4.5	FPM	24

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 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 (O₂)/Carbon Dioxide (CO₂) Determination

Flue gas O₂ and CO₂ concentrations for the Kiln 19 Breaching Duct and the Wet Gas Scrubber Stack were determined in accordance with USEPA Method 3A. An ECOM analyzer was used to determine the O₂ and CO₂ concentrations by connecting the analyzer to the exit of the dry gas meter. The O₂ instrument operates in the nominal range of 0% to 25% with the specific range determined by the high-level calibration gas. The CO₂ 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. Copies of the gas cylinder certifications are found in Appendix H. For testing on Coolers 22 and 23, per section 8.6 of USEPA Method 2, these sources are considered ambient and therefore 0.0% CO₂ and 20.9% O₂ concentrations were used for molecular weight determination at these test locations.

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 +/- 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.



3.0 TEST RESULT SUMMARIES

Client: Holcim (US) Inc.
 Facility: Alpena Cement Plant
 Test Location: Kiln 19 Breaching Duct
 Test Method: 5/29

	Source Condition	Normal	Normal	Normal	
	Date	9/9/20	9/9/20	9/9/20	
	Start Time	7:40	9:50	12:05	
	End Time	8:54	11:32	13:23	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	385.3	389.6	393.2	389.4	
Flue Gas Moisture, percent by volume	7.0%	4.0%	5.3%	5.4%	
Average Flue Pressure, in. Hg	30.38	30.38	30.38	30.38	
Gas Sample Volume, dscf	42.001	42.798	42.786	42.528	
Average Gas Velocity, ft/sec	28.328	28.897	29.039	28.755	
Gas Volumetric Flow Rate, acfm	134,842	137,550	138,228	136,873	
Gas Volumetric Flow Rate, dscfm	79,570	83,332	82,264	81,722	
Gas Volumetric Flow Rate, scfm	85,522	86,798	86,855	86,392	
Average %CO ₂ by volume, dry basis	17.8	17.0	17.6	17.5	
Average %O ₂ by volume, dry basis	8.9	8.9	9.1	9.0	
Isokinetic Variance	99.6	96.9	98.2	98.2	
Clinker Production Rate, ton/hr	43.01	41.88	43.14	42.68	
CPMS Response, mA	4.14	4.15	4.15	4.15	
Filterable Particulate Matter (Method 5)					
grams collected	0.00232	0.00231	0.00139	0.00201	
grains/acf	0.0005	0.0005	0.0003	0.0004	
grains/dscf	0.0009	0.0008	0.0005	0.0007	
lb/hr	0.581	0.595	0.353	0.510	
lb/ton	0.014	0.014	0.008	0.012	
Site Specific Operating Limit (SSOL) Determination					
Source Emissions Limit, lb/ton			0.07		
CPMS Zero, mA			4.000		
Filterable Particulate Matter, % of Emissions Limit			17.1%		
SSOL			4.64		



Client: Holcim (US) Inc.
Facility: Alpena Cement Plant
Test Location: Clinker Cooler 22
Test Method: 5

	Source Condition	Normal	Normal	Normal
	Date	9/15/20	9/15/20	9/15/20
	Start Time	8:00	11:08	13:28
	End Time	9:49	12:14	14:34
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	246.3	221.0	258.1	241.8
Flue Gas Moisture, percent by volume	1.8%	1.8%	1.9%	1.8%
Average Flue Pressure, in. Hg	29.55	29.55	29.55	29.55
Gas Sample Volume, dscf	74.897	78.969	78.374	77.413
Average Gas Velocity, ft/sec	32.412	32.925	34.426	33.254
Gas Volumetric Flow Rate, acfm	75,764	76,962	80,471	77,732
Gas Volumetric Flow Rate, dscfm	54,924	57,867	57,306	56,699
Gas Volumetric Flow Rate, scfm	55,940	58,927	58,429	57,765
Average %CO ₂ by volume, dry basis	0.0	0.0	0.0	0.0
Average %O ₂ by volume, dry basis	20.9	20.9	20.9	20.9
Isokinetic Variance	102.0	102.1	102.3	102.1
Clinker Production Rate, ton/hr	75.15	76.82	78.81	76.93
CPMS Response, mA	4.13	4.10	4.15	4.13
Filterable Particulate Matter (Method 5)				
grams collected	0.01304	0.00399	0.01124	0.00942
grains/acf	0.0019	0.0006	0.0016	0.0014
grains/dscf	0.0027	0.0008	0.0022	0.0019
lb/hr	1.265	0.387	1.087	0.913
lb/ton	0.017	0.005	0.014	0.012
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton			0.07	
CPMS Zero, mA			4.00	
Filterable Particulate Matter, % of Emissions Limit			17.0%	
SSOL			4.56	



Client: Holcim (US) Inc.
 Facility: Alpena Cement Plant
 Test Location: Clinker Cooler 23
 Test Method: 5

	Source Condition	Normal	Normal	Normal
	Date	9/15/20	9/15/20	9/15/20
	Start Time	8:00	10:13	12:18
	End Time	9:04	11:19	15:28
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	196.1	212.0	238.5	215.5
Flue Gas Moisture, percent by volume	1.9%	1.0%	2.0%	1.6%
Average Flue Pressure, in. Hg	29.55	29.55	29.55	29.55
Gas Sample Volume, dscf	44.564	43.871	48.144	45.526
Average Gas Velocity, ft/sec	20.479	20.604	24.169	21.751
Gas Volumetric Flow Rate, acfm	47,869	48,162	56,494	50,842
Gas Volumetric Flow Rate, dscfm	37,313	37,004	41,319	38,545
Gas Volumetric Flow Rate, scfm	38,039	37,370	42,172	39,194
Average %CO ₂ by volume, dry basis	0.0	0.0	0.0	0.0
Average %O ₂ by volume, dry basis	20.9	20.9	20.9	20.9
Isokinetic Variance	101.2	100.4	98.7	100.1
Clinker Production Rate, ton/hr	64.85	67.50	70.80	67.72
CPMS Response, mA	4.34	4.27	4.40	4.34
Filterable Particulate Matter (Method 5)				
grams collected	0.01477	0.01116	0.02167	0.01587
grains/acf	0.0040	0.0030	0.0051	0.0040
grains/dscf	0.0051	0.0039	0.0069	0.0053
lb/hr	1.636	1.245	2.460	1.780
lb/ton	0.025	0.018	0.035	0.026
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton			0.07	
CPMS Zero, mA			4.000	
Filterable Particulate Matter, % of Emissions Limit			37.3%	
SSOL			4.68	



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

	Source Condition	Normal	Normal	Normal	
	Date	9/12/20	9/12/20	9/12/20	
	Start Time	11:02	13:25	15:55	
	End Time	12:06	18:09	16:59	
		Run 1	Run 2	Run 3	Average
Stack Conditions					
Average Gas Temperature, °F		125.0	126.8	128.0	126.6
Flue Gas Moisture, percent by volume		13.4%	14.1%	14.5%	14.0%
Average Flue Pressure, in. Hg		29.50	29.50	29.50	29.50
Gas Sample Volume, dscf		46.017	46.413	46.847	46.426
Average Gas Velocity, ft/sec		62.609	63.781	64.208	63.533
Gas Volumetric Flow Rate, acfm		424,854	432,807	435,705	431,122
Gas Volumetric Flow Rate, dscfm		327,431	329,854	329,884	329,056
Gas Volumetric Flow Rate, scfm		378,096	383,998	385,830	382,641
Average %CO ₂ by volume, dry basis		17.8	17.7	18.0	17.8
Average %O ₂ by volume, dry basis		9.7	9.0	9.0	9.2
Isokinetic Variance		101.3	101.5	102.4	101.7
Clinker Production Rate, ton/hr		132.21	136.85	137.47	135.51
CPMS Response, mA		5.07	4.95	4.98	5.00
Filterable Particulate Matter (Method 5)					
grams collected		0.00848	0.00514	0.00867	0.00743
grains/acf		0.0022	0.0013	0.0022	0.0019
grains/dscf		0.0028	0.0017	0.0029	0.0025
lb/hr		7.984	4.830	8.077	6.964
lb/ton		0.060	0.035	0.059	0.051
Site Specific Operating Limit (SSOL) Determination					
Source Emissions Limit, lb/ton				0.07	
CPMS Zero, mA				4.00	
Filterable Particulate Matter, % of Emissions Limit				73.5%	
SSOL				5.02	



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.

CERTIFICATION

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



Eric L. Ehlers

Project Manager



Jeffrey M. Crivlare

Quality Assurance

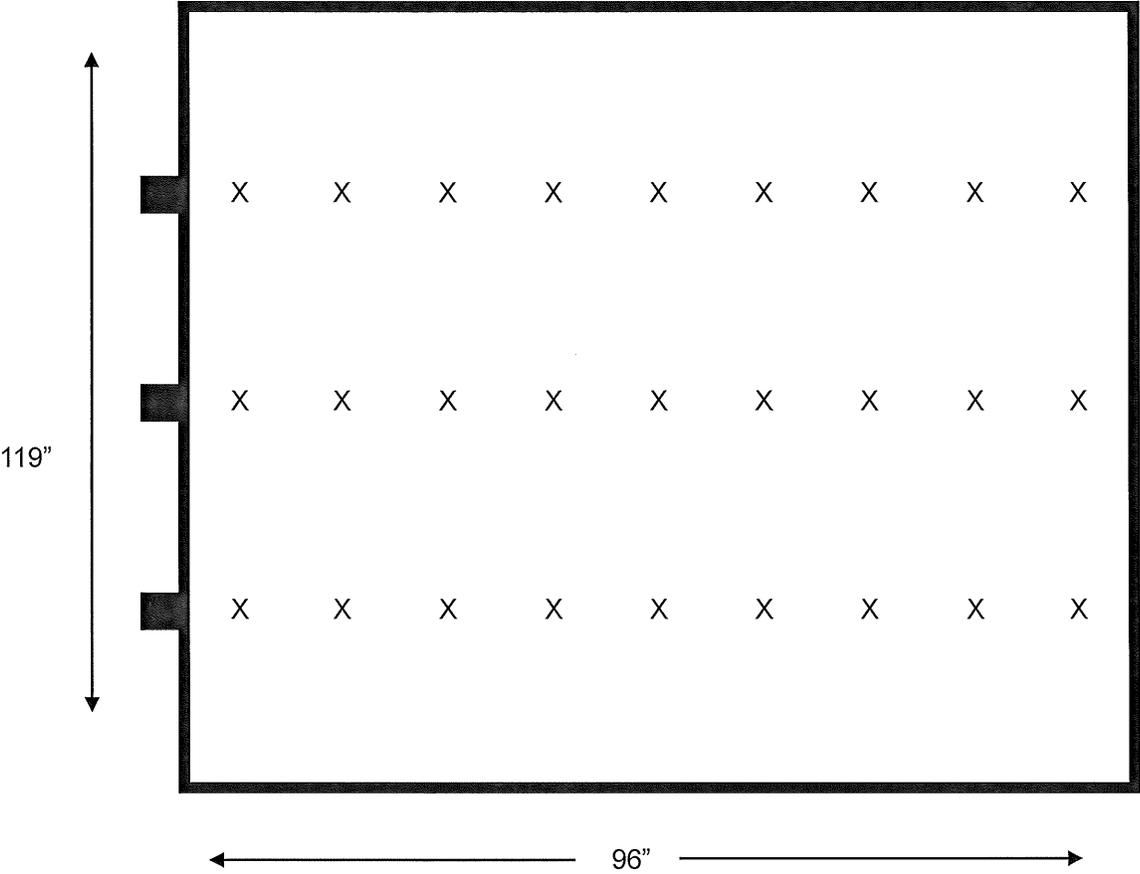


APPENDICES



Appendix A - Test Section Diagrams

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Job: Holcim (US) Inc.
Alpena Cement Plant
Alpena, Michigan

Test Date: September 9, 2020

Area: 79.33 square feet

Test Location: Kiln 19 Breaching Duct

No. Test Ports: 3

Length: 96 Inches

Tests Points per Port: 9

Width: 119 Inches

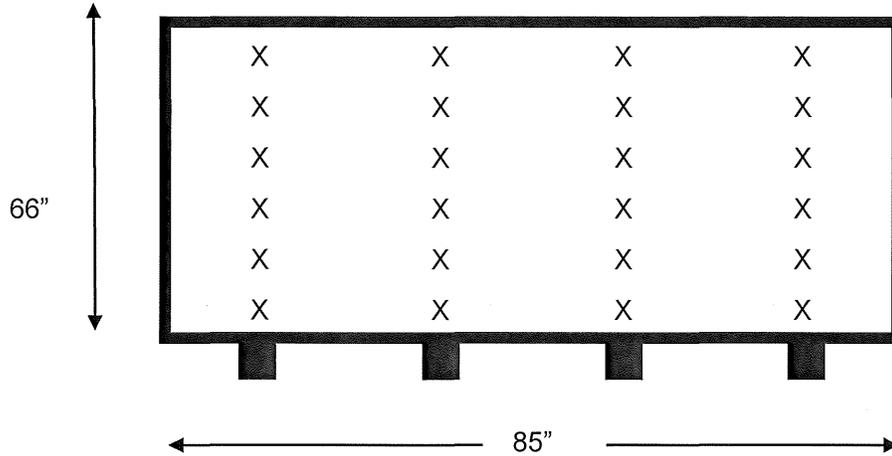
Upstream: 77.0 Inches

Downstream: 84.0 Inches

Equivalent Diameter: 106.3 Inches

Port Length: 3.25 Inches

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Project: Holcim (US) Inc.
Alpena, Michigan

Test Locations: Clinker Coolers 22 and
23 Stacks (Identical)

Test Date: September 14, 2020

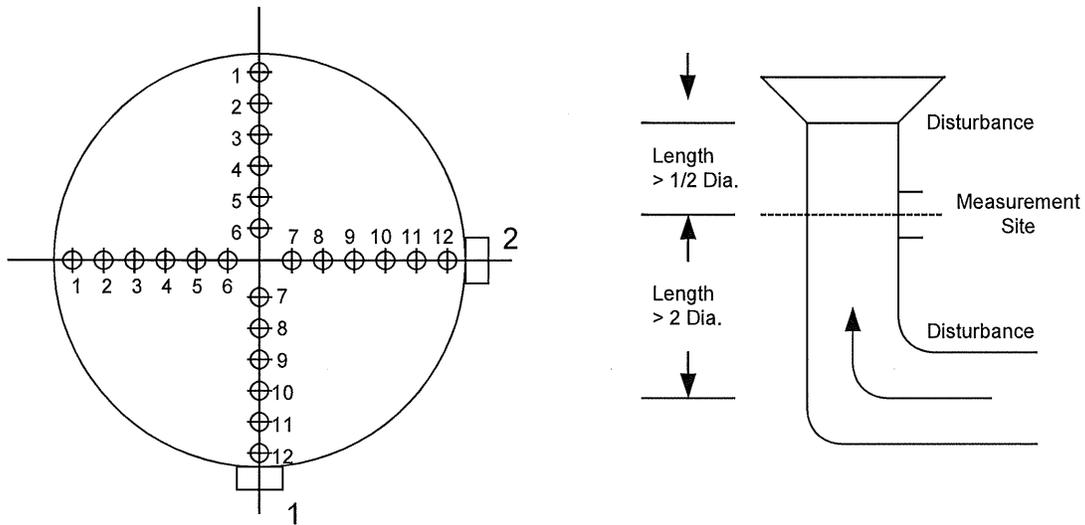
Stack Dimensions: 66" x 85"

Stack Area: 38.96 Square Feet

No. Points Per Port: 6

No. of Ports: 4

PARTICULATE MATTER TRAVERSE FOR ROUND DUCTS



Job: Holcim (US) Inc.
Alpena Cement Plant
Alpena, Michigan

Test Date: September 12, 2020

Test Location: Wet Scrubber Stack

Stack Diameter: 144.0 Inches

Stack Area: 113.097 Square Feet

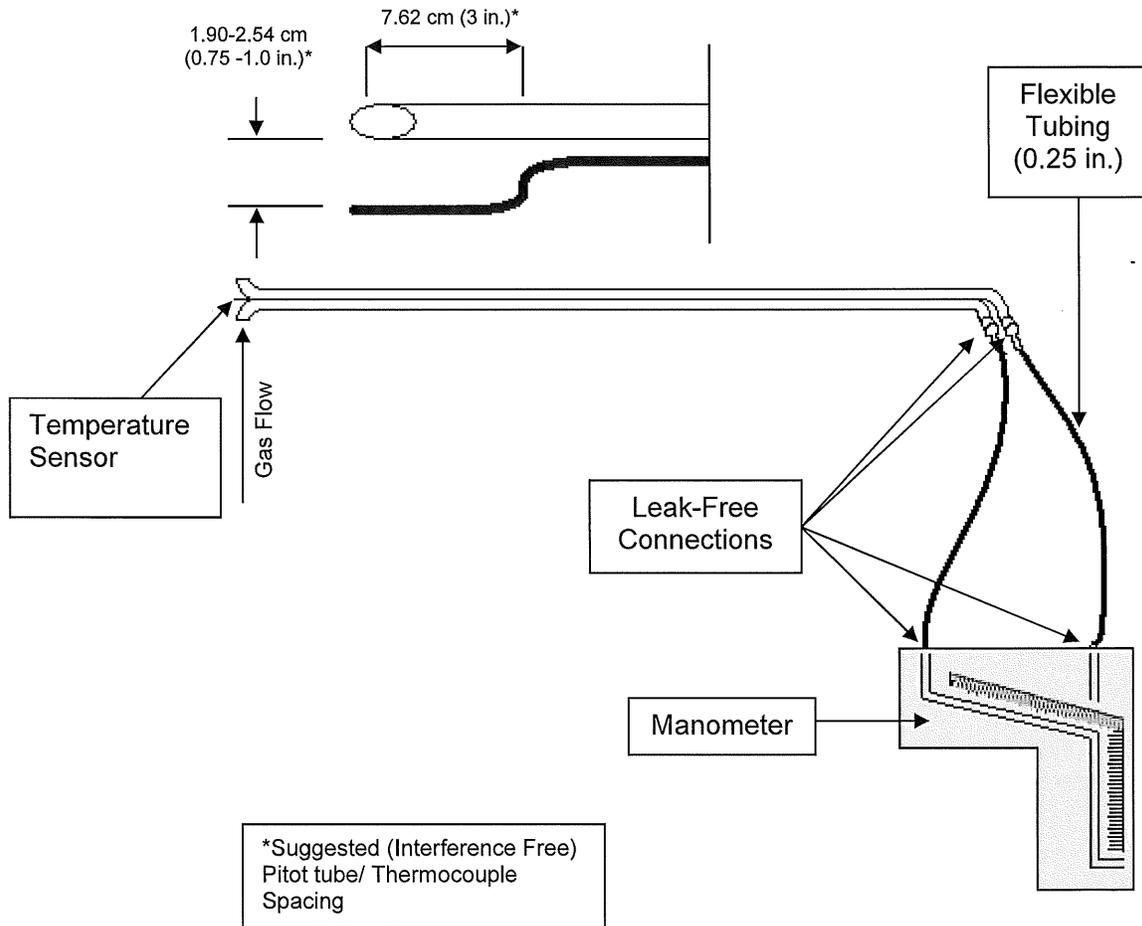
Upstream
Disturbance: 6.0 diameters

Downstream
Disturbance: 4.5 diameters

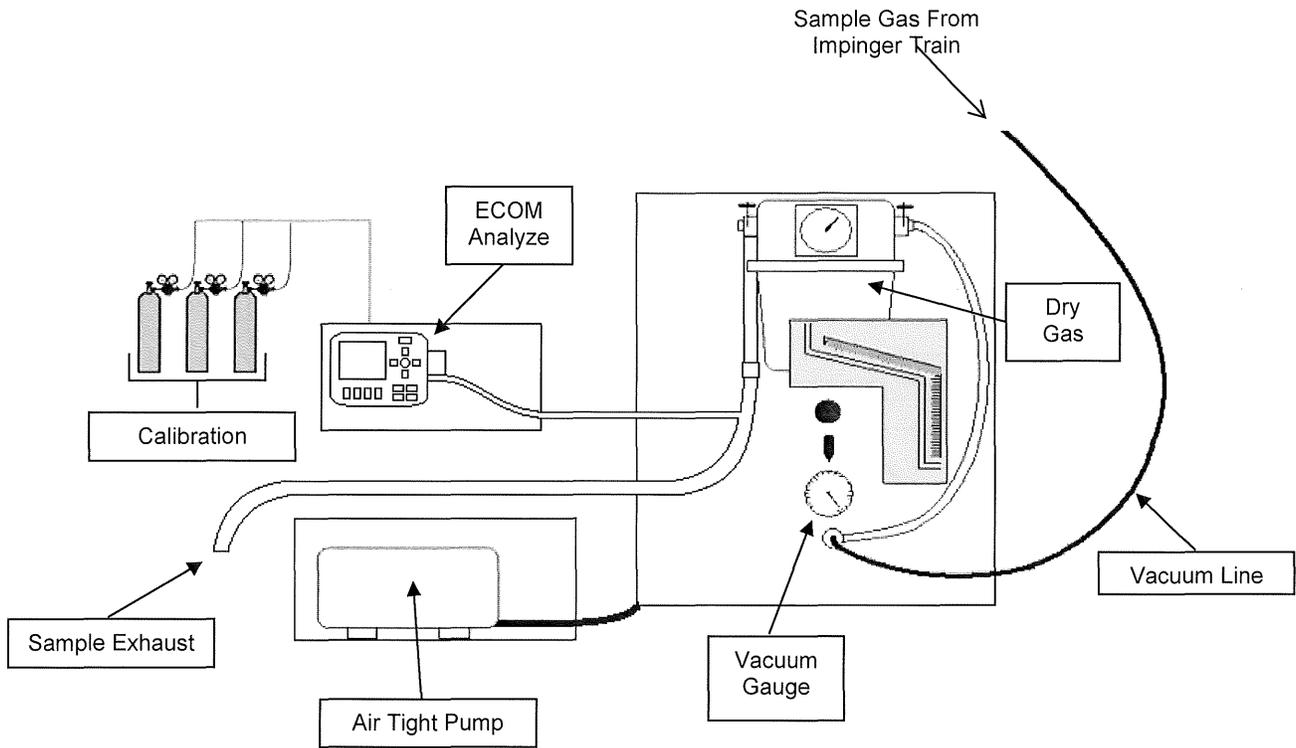
No. Sample Points: 24

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

