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Particulate Matter Compliance Emissions Test Report

Holcim (US) Inc. d/b/a Lafarge Alpena
Alpena Plant
Clinker Coolers KG5 Fan 92 and 93 Stacks and Clinker Coolers 22 and 23 Stacks
Alpena, Michigan
July 7 and July 28, 2022

Report Submittal Date
August 30, 2022

Project No. M222412B

Crown Point, IN | Mendota Heights, MN | Denver, CO | Henderson, NV

Corporate Headquarters
888 Industrial Drive
Elmhurst, Illinois 60126
630-993-2100

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1.0 EXECUTIVE SUMMARY

Mostardi Platt conducted a compliance test program for Holcim (US) Inc. d/b/a Lafarge Alpena at the Alpena Plant in Alpena, Michigan, on the Clinker Coolers 22 and 23 Stacks on July 7, 2022, and Clinker Coolers KG5 Fan 92 and 93 Stacks on July 28, 2022. 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**
Clinker Coolers 22 and 23 Stacks	July 7, 2022	Filterable Particulate Matter (FPM)
Clinker Coolers KG5 Fan 92 and 93 Stacks	July 28, 2022	FPM

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.*"

Test Location	Parameter	Date	Emission Rate	Emission Limit	CPMS SSOL
Clinker Cooler 22 Stack	FPM	7/7/2022	lb/ton	0.07 lb/ton	4.36
Clinker Cooler 23 Stack	FPM	7/7/2022	lb/ton	0.07 lb/ton	4.46
Clinker Cooler KG5 Fan 92 Stack	FPM	7/28/2022	lb/ton	0.07 lb/ton	7.03
Clinker Cooler KG5 Fan 93 Stack	FPM	7/28/2022	lb/ton	0.07 lb/ton	6.12

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	Ms. Mallory Miller Area Environmental Engineer 224-517-6896 Mallory.miller@lafargeholcim.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Chris Trezak Project Supervisor 630-993-2100 (phone) ctrezak@mp-mail.com
Testing Company Personnel		Mr. Scott McGough Project Supervisor
		Mr. Jeff Meyerhoff Test Technician
		Mr. Kenneth Beckham Test Engineer
Testing Company Personnel		Mr. Matt Friduss Test Technician
		Mr. Chris Buglio Test Engineer
		Mr. Jared Preisz Test Engineer
		Mr. Koilon West Test Technician
		Mr. Jason Carsello Test Engineer
		Mr. Josh Kolodziejcyk Test Technician

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**
Clinker Cooler 22 and 23 Stack (Identical)	85" x 66"	4	4.25"	>0.5	>2.0	FPM	24
Clinker Cooler KG5 Fan 92 and 93 Stack (Identical)	62" x 75.5"	7	4.5"	>0.5	>2.0	FPM	28

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. A 6-foot-long S-type pitot tube, 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 3 Oxygen (O_2)/Carbon Dioxide (CO_2) Determination

Per section 8.6 of EPA Method 2 (i.e., "for processes emitting essentially air, an analysis need not be conducted"), carbon dioxide and oxygen (CO_2/O_2) analysis was not be performed per EPA Method 3 or 3A. Instead, a dry molecular weight of 29.0 was assumed.

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: Clinker Cooler 22 Stack
Test Method: 5

Source Condition	Normal	Normal	Normal	
Date	7/7/22	7/7/22	7/7/22	
Start Time	9:25	15:04	16:36	
End Time	10:31	16:10	17:42	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	257.1	232.3	203.2	230.9
Flue Gas Moisture, percent by volume	1.9%	2.0%	2.0%	2.0%
Average Flue Pressure, in. Hg	29.55	29.55	29.55	29.55
Gas Sample Volume, dscf	50.589	44.647	49.476	48.237
Average Gas Velocity, ft/sec	26.238	22.362	23.702	24.101
Gas Volumetric Flow Rate, acfm	61,328	52,268	55,400	56,332
Gas Volumetric Flow Rate, dscfm	43,752	38,587	42,710	41,683
Gas Volumetric Flow Rate, scfm	44,600	39,377	43,564	42,514
Isokinetic Variance	101.7	101.8	101.9	101.8
Clinker Production Rate, ton/hr	80.40	77.18	65.09	74.22
CPMS Response, mA	4.029	4.041	4.026	4.032
Filterable Particulate Matter (Method 5)				
grams collected	0.00297	0.00426	0.00204	0.00309
grains/acf	0.0006	0.0011	0.0005	0.0007
grains/dscf	0.0009	0.0015	0.0006	0.0010
lb/hr	0.340	0.487	0.233	0.353
lb/ton	0.004	0.006	0.004	0.005
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton		0.07		
CPMS Zero, mA		4.000		
Filterable Particulate Matter, % of Emissions Limit		6.7%		
SSOL		4.36		

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

Source Condition	Normal	Normal	Normal	
Date	7/7/22	7/7/22	7/7/22	
Start Time	10:27	13:54	15:51	
End Time	11:33	15:00	16:57	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	219.0	202.3	195.3	205.5
Flue Gas Moisture, percent by volume	1.9%	1.9%	2.8%	2.2%
Average Flue Pressure, in. Hg	29.55	29.56	29.55	29.55
Gas Sample Volume, dscf	47.42	48.047	42.814	46.094
Average Gas Velocity, ft/sec	19.418	19.173	16.961	18.517
Gas Volumetric Flow Rate, acfm	45,388	44,815	39,645	43,283
Gas Volumetric Flow Rate, dscfm	34,182	34,629	30,653	33,155
Gas Volumetric Flow Rate, scfm	34,861	35,298	31,550	33,903
Isokinetic Variance	102.3	102.3	102.9	102.5
Clinker Production Rate, ton/hr	62.50	61.59	57.89	60.66
CPMS Response, mA	4.248	4.270	4.168	4.229
Filterable Particulate Matter (Method 5)				
grams collected	0.01966	0.01870	0.01143	0.01660
grains/acf	0.0048	0.0046	0.0032	0.0042
grains/dscf	0.0064	0.0060	0.0041	0.0055
lb/hr	1.874	1.783	1.082	1.580
lb/ton	0.030	0.029	0.019	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		37.0%		
SSOL		4.46		

Client: Holcim (US) Inc.
Facility: Alpena Cement Plant
Test Location: Clinker Cooler KG5 Fan 92
Test Method: 5

Source Condition	Normal	Normal	Normal	
Date	7/28/22	7/28/22	7/28/22	
Start Time	9:50	12:40	16:52	
End Time	11:25	14:04	18:11	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	180.0	206.1	171.9	186.0
Flue Gas Moisture, percent by volume	1.7%	1.1%	1.8%	1.5%
Average Flue Pressure, in. Hg	29.71	29.71	29.71	29.71
Gas Sample Volume, dscf	79.276	59.127	55.009	64.471
Average Gas Velocity, ft/sec	29.429	34.414	30.878	31.574
Gas Volumetric Flow Rate, acfm	57,406	67,130	60,232	61,589
Gas Volumetric Flow Rate, dscfm	46,229	52,244	49,072	49,182
Gas Volumetric Flow Rate, scfm	47,029	52,840	49,980	49,950
Isokinetic Variance	101.7	103.0	102.0	102.2
Clinker Production Rate, ton/hr	80.8	75.0	76.8	77.5
CPMS Response, mA	4.836	4.901	4.703	4.813
Filterable Particulate Matter (Method 5)				
grams collected	0.00924	0.01218	0.00940	0.01027
grains/acf	0.0014	0.0025	0.0021	0.0020
grains/dscf	0.0018	0.0032	0.0026	0.0025
lb/hr	0.713	1.423	1.109	1.082
lb/ton of clinker	0.009	0.019	0.014	0.014
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton		0.07		
CPMS Zero, mA		4.000		
Filterable Particulate Matter, % of Emissions Limit		20.1%		
SSOL		7.03		

Client: Holcim (US) Inc.
Facility: Alpena Cement Plant
Test Location: Clinker Cooler KG5 Fan 93
Test Method: 5

Source Condition	Normal	Normal	Normal	
Date	7/28/22	7/28/22	7/28/22	
Start Time	9:50	12:40	16:52	
End Time	11:25	14:04	18:11	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	171.9	199.1	167.9	179.6
Flue Gas Moisture, percent by volume	2.8%	1.4%	1.3%	1.8%
Average Flue Pressure, in. Hg	29.71	29.71	29.71	29.71
Gas Sample Volume, dscf	40.581	46.196	40.059	42.279
Average Gas Velocity, ft/sec	28.340	33.917	28.391	30.216
Gas Volumetric Flow Rate, acfm	55,282	66,159	55,381	58,941
Gas Volumetric Flow Rate, dscfm	44,607	51,888	45,630	47,375
Gas Volumetric Flow Rate, scfm	45,875	52,634	46,247	48,252
Isokinetic Variance	104.8	102.5	101.1	102.8
Clinker Production Rate, ton/hr	78.80	74.80	71.10	74.90
CPMS Response, mA	4.380	4.375	4.315	4.357
Filterable Particulate Matter (Method 5)				
grams collected	0.00457	0.00596	0.00294	0.00449
grains/acf	0.0014	0.0016	0.0009	0.0013
grains/dscf	0.0017	0.0020	0.0011	0.0016
lb/hr	0.664	0.885	0.443	0.664
lb/ton of clinker	0.008	0.012	0.006	0.009
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton		0.07		
CPMS Zero, mA		4.000		
Filterable Particulate Matter, % of Emissions Limit		12.6%		
SSOL		6.12		

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.

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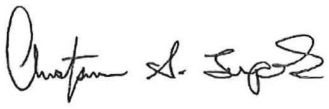


Project Manager

Christopher S. Trezak

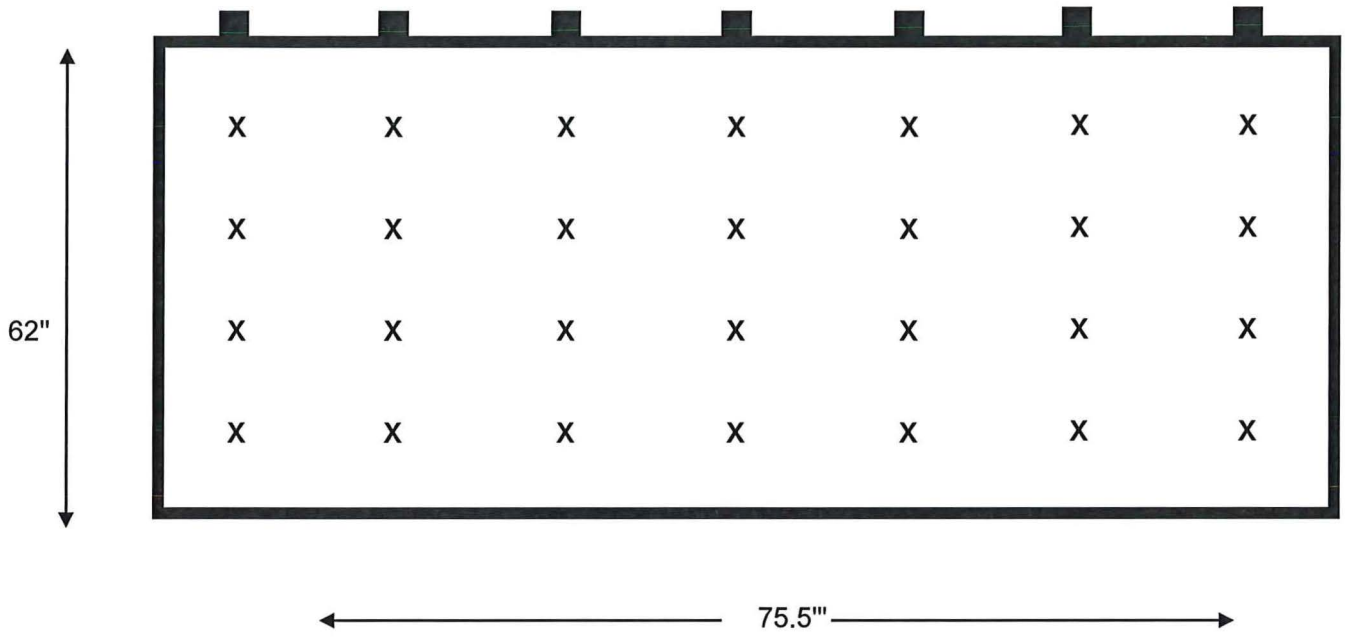
Quality Assurance

Eric L. Ehlers

APPENDICES

Appendix A - Test Section Diagrams

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Project: Holcim (US) Inc.
Alpena, Michigan

Test Location: Clinker Cooler KG5 Fan 92 and 93 Stacks
(Each Identical)

Test Date: July 28, 2022

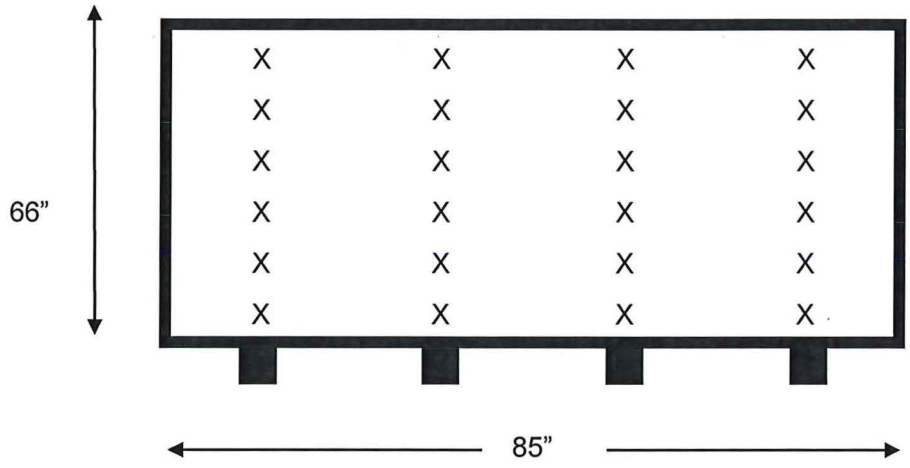
Stack Dimensions: 62" x 75.5"

Stack Area: 32.51 Square Feet

No. Points Per Port: 4

No. of Ports: 7

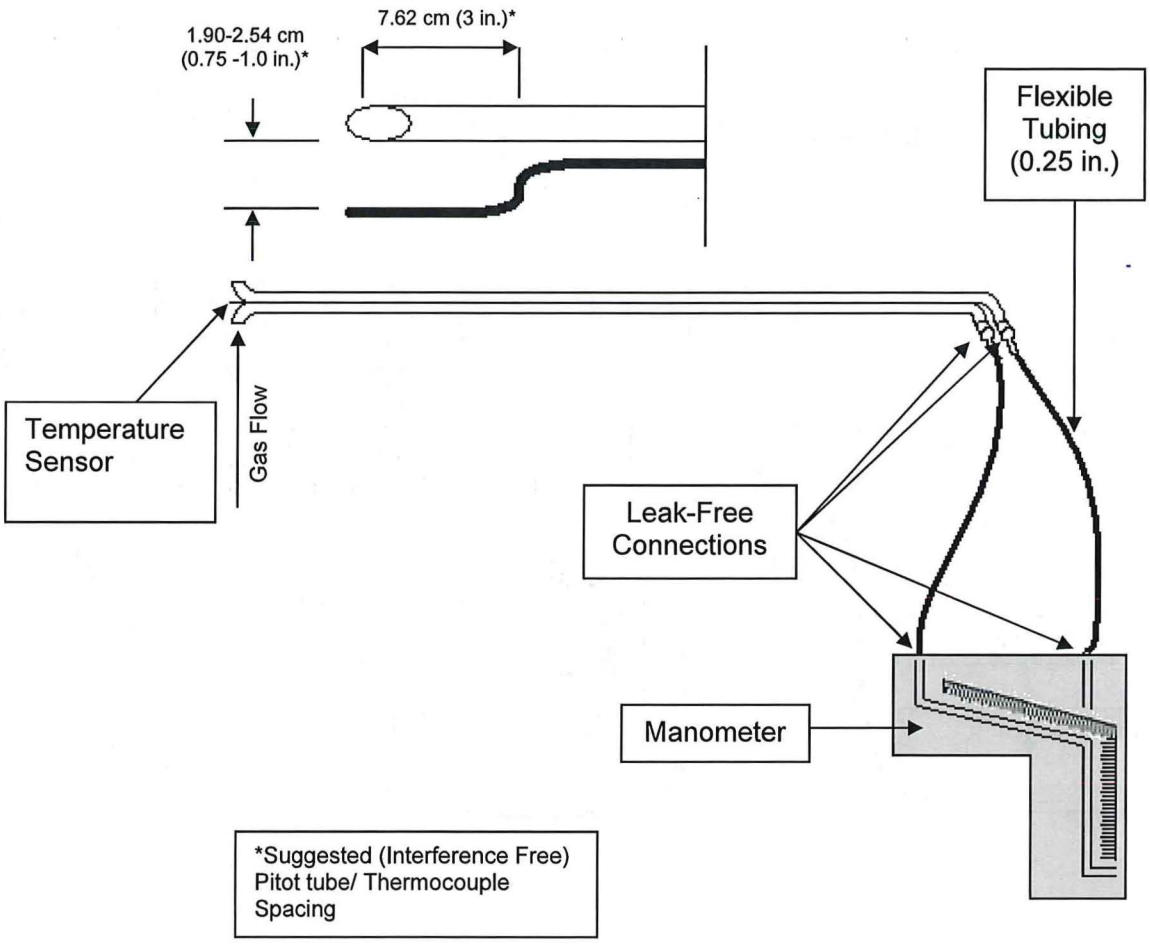
EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Project:	Holcim (US) Inc. Alpena, Michigan
Test Locations:	Clinker Coolers 22 and 23 Stacks (Identical)
Test Date:	July 7, 2022
Stack Dimensions:	66” x 85”
Stack Area:	38.96 Square Feet
No. Points Per Port:	6
No. of Ports:	4

Appendix B - Sample Train Diagrams

USEPA Method 2 – Type S Pitot Tube Manometer Assembly



USEPA Method 5- Particulate Matter Sample Train Diagram