

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 KG5 Fan 92 Stack and Fan 93 Stack on December 4, 2020. 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 Date | Test Parameter |
| Clinker Coolers KG5 Fan 92 Stack and Fan 93 Stack | December 4, 2020 | Filterable Particulate Matter (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 | Dates | Emission Rate | Emission Limit | CPMS SSOL* |
|------------------------------------|-----------|-----------|---------------|----------------|------------|
| Clinker Cooler KG5 Fan 92 Stack | FPM | 12/4/2020 | 0.024 lb/ton | 0.07 lb/ton | 5.37 |
| Clinker Cooler KG5 Fan 93 Stack | FPM | 12/4/2020 | 0.018 lb/ton | 0.07 lb/ton | 5.39 |

*The CPMS SSOL was based on mA recorded by CPMS during testing.

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. Daniel J. Kossack Project Manager 630-993-2100 (phone) dkossack@mp-mail.com |
| Testing Company Personnel | | Mr. Charels Reice Test Engineer |
| | | Mr. Damian Panek Test Engineer |
| | | Mr. Koilin West Test Engineer |
| | | Mr. Scott McGough Test Engineer |

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 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. An 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 3A Oxygen (O₂)/Carbon Dioxide (CO₂) Determination

An ECOM analyzer was used to determine O₂ and CO₂ concentrations in the flue gas in accordance with US EPA Method 3A. High and mid-range calibrations were performed using USEPA Protocol gas. A low ppm pollutant in balance nitrogen calibration gas was introduced during other instrument calibrations to check instrument zeros. Mid-range and zero calibrations were performed after each test run. All of the equipment used was calibrated in accordance with the specifications of the Method and calibration data are included in Appendix H. Copies of the gas cylinder certifications are included in Appendix I.

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 Plant
Test Location: Clinker Cooler KG5 Fan 92
Test Method: 5

| | 132.12 | 129.66 | 122.82 | |
|---|---------|---------|---------|---------|
| Source Condition | ton/hr | ton/hr | ton/hr | |
| Date | 12/4/20 | 12/4/20 | 12/4/20 | |
| Start Time | 7:30 | 10:05 | 15:50 | |
| End Time | 9:06 | 11:24 | 17:06 | |
| | Run 1 | Run 2 | Run 3 | Average |
| Stack Conditions | | | | |
| Average Gas Temperature, °F | 163.1 | 150.3 | 119.8 | 144.4 |
| Flue Gas Moisture, percent by volume | 2.2% | 1.7% | 0.7% | 1.5% |
| Average Flue Pressure, in. Hg | 29.30 | 29.30 | 29.30 | 29.30 |
| Gas Sample Volume, dscf | 57,978 | 60,248 | 56,779 | 58,335 |
| Average Gas Velocity, ft/sec | 23.550 | 23.960 | 21.408 | 22.973 |
| Gas Volumetric Flow Rate, acfm | 45,938 | 46,737 | 41,760 | 44,812 |
| Gas Volumetric Flow Rate, dscfm | 37,273 | 38,924 | 36,975 | 37,724 |
| Gas Volumetric Flow Rate, scfm | 38,115 | 39,597 | 37,242 | 38,318 |
| KG5 Fan 93 Gas Volumetric Flow Rate, scfm | 62,168 | 63,162 | 59,263 | 61,531 |
| Total KG5 Volumetric Flow Rate, scfm | 100,283 | 102,759 | 96,505 | 99,849 |
| KG5 Fan 92 % of Volumetric Flow Rate | 38.01% | 38.53% | 38.59% | 38.38% |
| 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 | 101.7 | 101.2 | 100.4 | 101.1 |
| Clinker Production Rate, ton/hr | 50.215 | 49.963 | 47.397 | 49.192 |
| CPMS Response, mA | 4.70 | 4.65 | 4.55 | 4.63 |
| Filterable Particulate Matter (Method 5) | | | | |
| grams collected | 0.01732 | 0.01549 | 0.00922 | 0.01401 |
| grains/acf | 0.0037 | 0.0033 | 0.0022 | 0.0031 |
| grains/dscf | 0.0046 | 0.0040 | 0.0025 | 0.0037 |
| lb/hr | 1.473 | 1.324 | 0.794 | 1.197 |
| lb/ton | 0.029 | 0.026 | 0.017 | 0.024 |
| Site Specific Operating Limit (SSOL) Determination | | | | |
| Source Emissions Limit, lb/ton | | | 0.07 | |
| CPMS Zero, mA | | | 4.00 | |
| Filterable Particulate Matter, % of Emissions Limit | | | 34.6% | |
| SSOL | | | 5.37 | |

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

| | 132.12 | 129.66 | 122.82 | |
|---|---------|---------|---------|---------|
| Source Condition | ton/hr | ton/hr | ton/hr | |
| Date | 12/4/20 | 12/4/20 | 12/4/20 | |
| Start Time | 7:30 | 10:05 | 15:50 | |
| End Time | 9:06 | 11:24 | 17:06 | |
| | Run 1 | Run 2 | Run 3 | Average |
| Stack Conditions | | | | |
| Average Gas Temperature, °F | 142.0 | 130.7 | 106.9 | 126.5 |
| Flue Gas Moisture, percent by volume | 1.4% | 1.7% | 0.9% | 1.3% |
| Average Flue Pressure, in. Hg | 29.28 | 29.28 | 29.28 | 29.28 |
| Gas Sample Volume, dscf | 44.745 | 45.311 | 42.802 | 44.286 |
| Average Gas Velocity, ft/sec | 37.128 | 37.012 | 33.331 | 35.824 |
| Gas Volumetric Flow Rate, acfm | 72,423 | 72,196 | 65,017 | 69,879 |
| Gas Volumetric Flow Rate, dscfm | 61,272 | 62,097 | 58,701 | 60,690 |
| Gas Volumetric Flow Rate, scfm | 62,168 | 63,162 | 59,263 | 61,531 |
| KG5 Fan 92 Gas Volumetric Flow Rate, scfm | 38,115 | 39,597 | 37,242 | 38,318 |
| Total KG5 Volumetric Flow Rate, scfm | 100,283 | 102,759 | 96,505 | 99,849 |
| KG5 Fan 93 % of Volumetric Flow Rate | 61.99% | 61.47% | 61.41% | 61.62% |
| 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 | 101.9 | 101.8 | 101.9 |
| Clinker Production Rate, ton/hr | 81.905 | 79.697 | 75.423 | 79.008 |
| CPMS Response, mA | 4.51 | 4.49 | 4.39 | 4.46 |
| Filterable Particulate Matter (Method 5) | | | | |
| grams collected | 0.01167 | 0.00625 | 0.00520 | 0.00771 |
| grains/acf | 0.0034 | 0.0018 | 0.0017 | 0.0023 |
| grains/dscf | 0.0040 | 0.0021 | 0.0019 | 0.0027 |
| lb/hr | 2.113 | 1.133 | 0.943 | 1.396 |
| lb/ton | 0.026 | 0.014 | 0.013 | 0.018 |
| Site Specific Operating Limit (SSOL) Determination | | | | |
| Source Emissions Limit, lb/ton | | 0.07 | | |
| CPMS Zero, mA | | 4.00 | | |
| Filterable Particulate Matter, % of Emissions Limit | | 25.0% | | |
| SSOL | | 5.39 | | |

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



Daniel J. Kossack

Project Manager

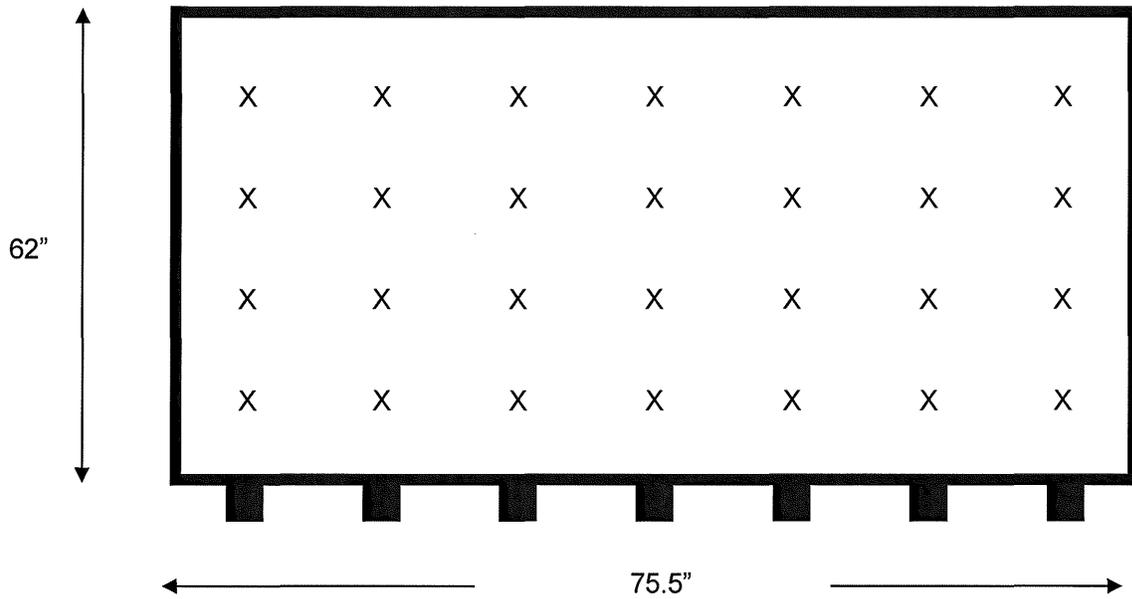


Jeffrey M. Crivlare

Quality Assurance

APPENDICES

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: December 4, 2020

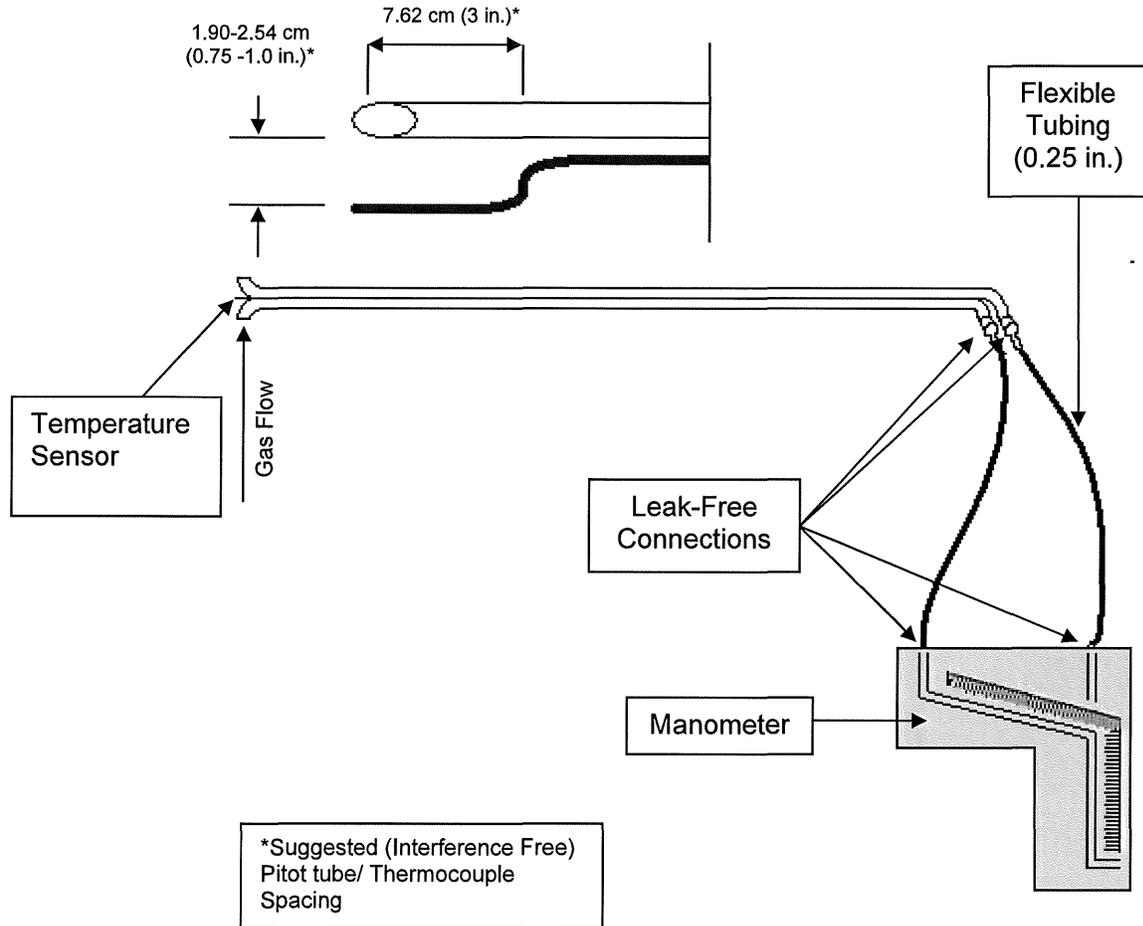
Stack Dimensions: 62" x 75.5"

Stack Area: 32.51 Square Feet

No. Points Per Port: 4

No. of Ports: 7

USEPA Method 2 – Type S Pitot Tube Manometer Assembly



USEPA Method 5- Particulate Matter Sample Train Diagram

