ARGOS

Cement Mill Test Report

Month of Issue: July 2016

Plant:	**Calera, AL**
Product:	**Portland Cement Type I/II (MH)**
Silo:	**17, 18J, 19, 20**
Manufactured:	**June 2016**

ASTM C150-16 and AASHTO M85-16 Standard Requirements

CHEMICAL ANALYSIS

Item	Spec limit	Test Result
Rapid Method, X-Ray *(C114)*		
SiO2 (%)	---	19.8
Al2O3 (%)	6.0 max	4.6
Fe2O3 (%)	6.0 max	3.0
CaO (%)	---	63.3
MgO (%)	6.0 max	3.1
SO3 (%)	3.0 max *	3.2
Loss on Ignition (%)**	3.5 max	2.8
Insoluble residue (%)	1.5 max	0.10
CO2 (%)	---	1.8
Limestone (%)	5.0 max	4.1
CaCO3 in Limestone (%)	70 min	98
Inorganic Process Addition ()	5.0 max	---
Adjusted Potential Phase Composition *(C150)*		
C3S (%)	---	64
C2S (%)	---	16
C3A (%)	8 max	7
C4AF (%)	---	9
C3S+4.75*C3A (%)	100 max	87
ASTM C150 and AASHTO M85 Optional Chemical Requirements:		
NaEq (%)	0.60 max	0.38

PHYSICAL ANALYSIS

Item	Spec limit	Test Result	
Air content of mortar (%) *(C185)*	12 max	8	
Blaine Fineness (m^2/kg) *(C204)*	260 - 430	382	
-325 (%) *(C430)*	---	96.5	
Autoclave expansion (%) *(C151)*	0.80 max	0.06	
Compressive strength (MPa, [PSI]) *(C109)*			
1 day		14.4	[2090]
3 days	12.0 [1740] min	26.3	[3820]
7 days	19.0 [2760] min	34.1	[4950]
28 days (Reflects previous month's data)	---	47.1	[6840]
Time of setting (minutes)			
Vicat initial *(C191)*	45 - 375	108	
Heat of Hydration (kJ/kg) (C1702)			
3 days (for information only)***	---	287	
Mortar Bar Expansion (%) (C1038)***	0.020 max	0.007	
Density (C188)		3.16	

* May exceed 3.0% SO3 maximum based on our C1038 results of < 0.020% expansion at 14 days.

** Loss on ignition max of 3.5% when limestone is an ingredient

*** Test result represents most recent value and is provided for information only.

We certify that the above described cement, at the time of shipment, meets the chemical and physical requirements of applicable FDOT Section 921, ALDOT, GDOT, TDOT, MDOT, INDOT, La DOTD, NCDOT, VDOT, SCDOT, AHTD Specifications for TYPE I/II (MH); ASTM C150 & AASHTO M85 STANDARD SPECIFICATIONS FOR TYPE I/II (MH) CEMENT; ASTM C150 & AASHTO M85 OPTIONAL CHEMICAL REQUIREMENTS FOR TYPE I/II (MH) LOW ALKALI CEMENT.

Certified By:

Nicholas T. Ewing - Quality Coordinator

Argos USA - Roberta
8039 Highway 25, Calera, AL 35040
Phone: 205.668.2721

Report created: 07/21/2016

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MATERIALS, INC.
CONTINUOUS IMPROVEMENT

AGGREGATE GRADATION - SPECIFIC GRAVITY

SOURCE and SAMPLING INFORMATION

Aggregate Source:	Hammett	**Aggregate Type:**	#57
MDOT Agg Source #:	3-26-2	**Date Sampled:**	8/22/2016
Sampling Location:	Plant Stock Pile	**Date Tested:**	8/22/2016
Sampled by:	Ben Hardy	**Tested by:**	Ben Hardy

GRADATION INFORMATION

Initial Weight (grams) 10876.6 — **Minimum Initial Dry Weight Required (grams)** 10000 — Acceptable

Sieve		Weight Retained Cumulative (grams)	Weight Retained Individual (grams)	Percent Retained Cumulative (%)	Percent Retained Individual (%)	Total % Passing (%)	MDOT % Passing MIN (%)	MDOT % Passing MAX (%)	Gradation Status
2 inch	63.0 mm								
1-1/2 inch	50.0 mm						100	100	Acceptable
1-1/4 inch	37.5 mm					100.0			
1 inch	25.0 mm	532.1	532.1	4.9	4.9	95.1	80	100	Acceptable
3/4 inch	19.0 mm	2108.2	1576.1	19.4	14.5	80.6			
1/2 inch	12.5 mm	5977.6	3869.4	55.0	35.6	45.0	25	60	Acceptable
3/8 inch	9.5 mm	9046.0	3068.4	83.2	28.2	16.8			
No. 4	4.75 mm	10535.8	1489.8	96.9	13.7	3.1	0	10	Acceptable
No. 8	2.36 mm	10711.0	175.2	98.5	1.6	1.5	0	5	Acceptable
No. 16	1.18 mm								
No. 30	0.6 mm								
No. 40	0.425 mm								
No. 50	0.3 mm								
No. 100	0.15 mm								
No. 200	0.15 mm								
Pan		10867.0	156.0	99.9					
Total		10867.0							

Required Final Dry Weight Range (grams) 10844.0 — 10909.2 — Acceptable

GRADATION SUMMARY

Did the Initial Weight meet or exceed the Minimum required weight? **Yes.**
Did the gradation meet all the requirements for gradation? **Yes.**
Is the Total Weight within 0.3% of Initial Dry Weight? **Yes.**

Sieve size: **16 x 24 inch**
Was any sieve overloaded? **No.**

Fineness Modulus: **6.98**

GRADATION STATUS: Acceptable

SPECIFIC GRAVITY INFORMATION

FINE AGGREGATE

Pycnometer Method

Mass of oven-dry specimen in air:		Bulk SG (*OD Basis*):	
Mass of pycnometer filled with water:		Bulk SG (SSD Basis):	
Mass of pycnometer with specimen and water :		Apparent SG:	
Mass of saturated, surface-dry specimen:		Absorption (%):	

COARSE AGGREGATE

Mass of oven-dry specimen in air:	5689.7	Bulk SG (*OD Basis*):	2.45
Mass of saturated, surface-dry specimen in air:	5822.1	Bulk SG (SSD Basis):	2.51
Mass of saturated sample in water:	3503.3	Absorption (%):	2.33

FINE AGGREGATE EQUIVALENCY INFORMATION

ASTM D2419

Sand Reading			
Clay Reading		Sand Equivalent Value	

Comments: _____

AGGREGATE GRADATION - SPECIFIC GRAVITY

SOURCE and SAMPLING INFORMATION

Aggregate Source:	Hammett	Aggregate Type:	Fine
MDOT Agg Source #:	3-26-2	Date Sampled:	8/22/2016
Sampling Location:	Plant Stock Pile	Date Tested:	8/22/2016
Sampled by:	Ben Hardy	Tested by:	Ben Hardy

GRADATION INFORMATION

Initial Weight (grams) 541.3 — Minimum Initial Dry Weight Required (grams) 300 — Acceptable

Sieve		Weight Retained Cumulative (grams)	Weight Retained Individual (grams)	Percent Retained Cumulative (%)	Percent Retained Individual (%)	Total % Passing (%)	MDOT % Passing MIN (%)	MDOT % Passing MAX (%)	Gradation Status
2 inch	63.0 mm								
1-1/2 inch	50.0 mm								
1-1/4 inch	37.5 mm								
1 inch	25.0 mm								
3/4 inch	19.0 mm								
1/2 inch	12.5 mm						100	100	Acceptable
3/8 inch	9.5 mm					100.0	97	100	Acceptable
No. 4	4.75 mm	21.0	21.0	3.9	3.9	96.1	92	100	Acceptable
No. 8	2.36 mm	56.2	35.2	10.4	6.5	89.6	75	100	Acceptable
No. 16	1.18 mm	90.7	34.5	16.8	6.4	83.2	45	90	Acceptable
No. 30	0.6 mm	176.9	86.2	32.7	15.9	67.3	25	70	Acceptable
No. 40	0.425 mm	331.0	154.1	61.1	28.4	38.9			
No. 50	0.3 mm	473.6	142.6	87.5	26.4	12.5	3	35	Acceptable
No. 100	0.15 mm	538.0	64.4	99.4	11.9	0.6	0	10	Acceptable
No. 200	0.15 mm	540.0	2.0	99.8	0.4	0.2			
Pan		541.6	1.6	100.1					
Total		541.6							

Required Final Dry Weight Range (grams) 539.7 — 542.9 — Acceptable

GRADATION SUMMARY

Did the Initial Weight meet or exceed the Minimum required weight? **Yes.**
Did the gradation meet all the requirements for gradation? **Yes.**
Is the Total Weight within 0.3% of Initial Dry Weight? **Yes.**

Sieve size: **8 inch dia.**
Was any sieve overloaded? **No.**

Fineness Modulus: **2.51**

GRADATION STATUS: Acceptable

SPECIFIC GRAVITY INFORMATION

FINE AGGREGATE

Pycnometer Method

Mass of oven-dry specimen in air:	496.6	Bulk SG (*OD Basis*):	2.59
Mass of pycnometer filled with water:	702.5	Bulk SG (SSD Basis):	2.61
Mass of pycnometer with specimen and water:	1011.0	Apparent SG:	2.64
Mass of saturated, surface-dry specimen:	500.0	Absorption (%):	0.68

COARSE AGGREGATE

Mass of oven-dry specimen in air:		Bulk SG (*OD Basis*):	
Mass of saturated, surface-dry specimen in air:		Bulk SG (SSD Basis):	
Mass of saturated sample in water:		Absorption (%):	

FINE AGGREGATE EQUIVALENCY INFORMATION

ASTM D2419

Sand Reading			
Clay Reading		Sand Equivalent Value	

Comments: _____

BASF

We create chemistry

August 26, 2016

MMC Materials, Inc.
P. O. Box 307
Jackson, Ms. 39205

Attention: Ben Hardy
Project: Various
Project location: Various

Certificate of Conformance
MasterSure® Z 60 Admixture (formerly RheoTEC Z-60)
BASF Corporation Admixture for Concrete

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:
That MasterSure Z 60 admixture is a Workability-Retaining Admixture manufactured by BASF Corporation; and
That MasterSure Z 60 admixture and RheoTEC Z-60 admixture are the same product having identical composition, differing only in designation; and
That no calcium chloride or chloride based ingredient is used in the manufacture of MasterSure Z 60 admixture; and
That MasterSure Z 60 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00007 percent (0.7 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100kg (1 fluid ounce per 100 pounds) of cement; and
That MasterSure Z 60 admixture meets the requirements for a Type S, Specific Performance, Admixture as specified in Table 1 of ASTM C494/C494M and AASHTO M194, the Standard Specifications for Chemical Admixtures for Concrete.

Richard Hubbard III

Richard Hubbard
Sr. Technical Marketing Specialist

BASF Corporation
Admixtures Systems
23700 Chagrin Boulevard
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Telephone (216) 839-7500

MASTER® BUILDERS SOLUTIONS

BASF

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August 26, 2016

MMC Materials, Inc.
P. O. Box 307
Jackson, Ms. 39205

Attention: Ben Hardy
Project: Various
Project location: Various

Certificate of Conformance
MasterGlenium® 7500 Admixture (formerly Glenium 7500)
BASF Corporation Admixture for Concrete

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:
That MasterGlenium 7500 admixture is a full-range water-reducing admixture manufactured by BASF Corporation; and
That MasterGlenium 7500 admixture and Glenium 7500 admixture are the same product having identical composition, differing only in designation; and
That no calcium chloride or chloride based ingredient is used in the manufacture of MasterGlenium 7500 admixture; and
That MasterGlenium 7500 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00017 percent (1.7 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and
That MasterGlenium 7500 admixture meets the requirements for a Type A, Water-Reducing and Type F, Water-Reducing, High Range Admixture specified in ASTM C494/C494M, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Type A and Type F admixtures as specified in Corps of Engineers' CRD-C 87 and AASHTO M194.

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August 26, 2016

MMC Materials, Inc.
P. O. Box 307
Jackson, Ms. 39205

Attention: Ben Hardy
Project: Various
Project location: Various

Certificate of Conformance
MasterAir® AE 90 Admixture (formerly MB-AE 90)
BASF Corporation Air-Entraining Admixture for Concrete"

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:
That MasterAir AE 90 admixture is a BASF Corporation Air-Entraining Admixture for concrete; and
That MasterAir AE 90 and MB AE 90 admixture are the same product having identical composition, differing only in designation; and
That no calcium chloride or chloride based ingredient is used in the manufacture of MasterAir AE 90 admixture; and
That MasterAir AE 90 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.000068 percent (0.68 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and
That MasterAir AE 90 admixture meets the requirements of ASTM C260, the Standard Specification for Air-Entraining Admixtures for Concrete, as well as the requirements for air-entraining admixtures as specified in Corps of Engineers' CRD-C 13 and AASHTO M154.

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