



The Monarch Cement Company

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Certified Mill Test Report - Type III

Production Period: June 1 - June 30, 2017

The following is based on average test data during the production period. The data is typical of cement produced at The Monarch Cement Company, Humboldt, KS. Individual shipments may vary.

PHYSICAL

	Reported	Spec Limit		Reported	Spec Limit
325 Sieve, % Passing	98.9	-	Air Content of Mortar (volume %)	8.3	12.0 max
Blaine fineness, specific surface			Autoclave Expansion (%)	-0.047	0.80 max
Air Permeability (cm ² /g)	5960	-	Compressive Strength (psi)		
Time of Setting, Gilmore test:			1 Day	3077	1740 min
Initial (hrs:min)	2:00	60 min	3 Days	4309	3480 min
Final (hrs:min)	3:40	600 max	7 Days	5622	-

CHEMICAL

	Reported	Spec Limit		Reported	Spec Limit
SiO ₂ - Silicon dioxide (%)	21.17	-	Loss on ignition (%)	1.33	3.0 max
Fe ₂ O ₃ - Ferric oxide (%)	2.92	6.0 max	Insoluble residue (%)	0.12	1.50 max
Al ₂ O ₃ - Aluminum oxide (%)	4.56	6.0 max	Free lime (%)	0.70	-
CaO - Calcium oxide (%)	63.03	-	Na ₂ O - Sodium oxide (%)	0.20	-
MgO - Magnesium oxide (%)	1.39	6.0 max	K ₂ O - Potassium oxide (%)	0.58	-
SO ₃ - Sulphur trioxide (%)	3.5	3.5 max	Equivalent Alkalies (%)	0.57	0.60 max

POTENTIAL CALCULATED COMPOUNDS

	Reported	Spec Limit
C ₃ S - Tricalcium silicate (%)	50.9	-
C ₂ S - Dicalcium silicate (%)	22.3	-
C ₃ A - Tricalcium aluminate (%)	7.1	15 max
C ₄ AF - Tetracalcium aluminoferrite (%)	8.9	-

The cement in this shipment meets standard requirements in the current specifications of the Federal Government and the American Society for Testing and Materials for Type III Portland Cement. All tests conform to AASHTO M-85 and ASTM Test Methods: Chemical C-114, Blaine C-204, Soundness C-151, Gillmore C-266, Compressive Strength C-109, Air Content C-185, and C-150.

Date: 8/17/2017

Sean D. Bowman
 Quality Control Supervisor