



# The Monarch Cement Company

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## Certified Mill Test Report - Type I/II

Production Period: April 2023

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

	<u>Reported</u>	<u>Spec Limit</u>		<u>Reported</u>	<u>Spec Limit</u>
325 Sieve, % Passing	93.4	-	Air Content of Mortar (volume %)	8.1	<b>12.0 max</b>
Blaine fineness, specific surface					
Air Permeability (cm <sup>2</sup> /g)	3800	<b>2600 min</b>	Compressive Strength (psi)		
Time of Setting, Vicat test:			1 Day	2208	-
Initial (minutes)	78	<b>45 min</b>	3 Days	3436	<b>1740 min</b>
Final (minutes)	155	<b>375 max</b>	7 Days	4794	<b>2760 min</b>
Specific Gravity	3.13				

### CHEMICAL

	<u>Reported</u>	<u>Spec Limit</u>		<u>Reported</u>	<u>Spec Limit</u>
SiO <sub>2</sub> - Silicon dioxide (%)	20.80	-	Loss on ignition (%)	1.26	<b>3.0 max</b>
Fe <sub>2</sub> O <sub>3</sub> - Ferric oxide (%)	2.84	<b>6.0 max</b>	Insoluble residue (%)	0.13	<b>1.50 max</b>
Al <sub>2</sub> O <sub>3</sub> - Aluminum oxide (%)	4.61	<b>6.0 max</b>	Free lime (%)	0.85	-
CaO - Calcium oxide (%)	63.91	-	Na <sub>2</sub> O - Sodium oxide (%)	0.17	-
MgO - Magnesium oxide (%)	1.58	<b>6.0 max</b>	K <sub>2</sub> O - Potassium oxide (%)	0.58	-
SO <sub>3</sub> - Sulphur trioxide (%)	2.82	<b>3.0 max</b>	Equivalent Alkalies (%)	0.57	-
			Inorganic Processing Addition (%)	2.10	<b>5.0 max</b>

### POTENTIAL CALCULATED COMPOUNDS

C <sub>3</sub> S - Tricalcium silicate (%)	59.1	-
C <sub>2</sub> S - Dicalcium silicate (%)	15.3	-
C <sub>3</sub> A - Tricalcium aluminate (%)	7.4	<b>8 max</b>
C <sub>4</sub> AF - Tetracalcium aluminoferrite (%)	8.6	-

### INORGANIC PROCESS ADDITON (C150)

SiO <sub>2</sub> - Silicon dioxide (%)	11.2
Fe <sub>2</sub> O <sub>3</sub> - Ferric oxide (%)	3.21
Al <sub>2</sub> O <sub>3</sub> - Aluminum oxide (%)	3.78
CaO - Calcium oxide (%)	59.0
SO <sub>3</sub> - Sulphur trioxide (%)	0.52

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 I and for Type II 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, C-465 and C-150.

Date: 4/23/2024

Mitchell R. King  
Quality Control Manager