

LEHIGH

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PERMANENTE PLANT

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CEMENT TEST REPORT

Cement: Permanente Type III, low alkali

Production Period: July 2010

Report Date: 8/12/2010

STANDARD CHEMICAL REQUIREMENTS ASTM C 114	TEST RESULTS	ASTM C 150 SPECIFICATIONS TYPE III
Silicon Dioxide (SiO ₂), %	21.7	----
Aluminum Oxide (Al ₂ O ₃), %	3.8	----
Ferric Oxide (Fe ₂ O ₃), %	3.8	----
Calcium Oxide (CaO), %	65.3	----
Magnesium Oxide (MgO), %	1.3	6.0 Max
Sulfur Trioxide (SO ₃), %	3.1	3.5 Max
Loss on Ignition (LOI), %	0.8	3.0 Max
Insoluble Residue, %	0.39	0.75 Max
Alkalies (Na ₂ O equivalent), %	0.26	0.60 Max
Tricalcium Silicate (C ₃ S), % ^a	60	----
Dicalcium Silicate (C ₂ S), % ^a	16	----
Tricalcium Aluminate (C ₃ A), % ^a	4	15 Max
Tetracalcium Aluminoferrite (C ₄ AF), % ^a	11	----
2 (C ₃ A) + C ₄ AF, %	18	----
PHYSICAL REQUIREMENTS		
(ASTM C 1038) Expansion @ 14 days, %	0.004	0.020 Max
(ASTM C 452) Expansion @ 14 days, %	0.021	----
(ASTM C 204) Blaine Fineness, m ² /gm	515	280 Min
(ASTM C 430) -325 Mesh, %	99.9	----
(ASTM C114) Limestone, max, %	2.5	5 Max
(ASTM C 191) Time of Setting - Initial (Vicat)	83	45 Min
(ASTM C 191) Time of Setting - Final (Vicat)	190	375 Max
(ASTM C 451) False Set, %	89	----
(ASTM C 185) Air Content, %	8.4	12 Max
(ASTM C 151) Autoclave Expansion, %	-0.02	0.80 Max
(ASTM C 187) Normal Consistency, %	29.0	----
(ASTM C 109) Compressive Strength, psi (MPa)		
1 Day	2931	1740 (12.0)
3 Day	4478	3480 (24.0)
7 Day	5579	----
28 Day (previous month)	8379	----

This cement meets the requirements of specification:

ASTM C150-07 Type III, Low Alkali

^a Adjusted per ASTM C-150-09 Section A1.6

Federal Specification

SS-C190/3 for Type

Caltrans Section 90-2.01 for Type III, low alkali Portland cement

ASTM C 1157 Portland Cement Type HE (MS)



Alan Sabawi, Quality Control Manager