

LEHIGH

HEIDELBERGCEMENT Group

TECHNICAL SERVICES SALES & MARKETING

12667 Alcosta Blvd., Suite 400
 San Ramon, CA 94583
 Telephone (925) 244 6500
 FAX (925) 244 6586



PERMANENTE PLANT

24001 Stevens Creek Blvd.
 Cupertino, CA 95014-5659
 Telephone (408) 996-4033
 FAX (408) 996-4033

CEMENT TEST REPORT

Cement: Permanente Type III, low alkali

Production Period: July 2011

Report Date: 8/17/2011

STANDARD CHEMICAL REQUIREMENTS ASTM C 114	TEST RESULTS	ASTM C 150-09 SPECIFICATIONS TYPE III
Silicon Dioxide (SiO ₂), %	21.2	----
Aluminum Oxide (Al ₂ O ₃), %	3.7	----
Ferric Oxide (Fe ₂ O ₃), %	3.6	----
Calcium Oxide (CaO), %	65.2	----
Magnesium Oxide (MgO), %	1.6	6.0 Max
Sulfur Trioxide (SO ₃), %	3.6	3.5 Max
Loss on Ignition (LOI), %	1.1	3.0 Max
Insoluble Residue, %	0.27	0.75 Max
Alkalies (Na ₂ O equivalent), %	0.35	0.60 Max
Tricalcium Silicate (C ₃ S), % ^a	63	----
Dicalcium Silicate (C ₂ S), % ^a	12	----
Tricalcium Aluminate (C ₃ A), % ^a	3	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, %	0.022	----
(ASTM C 204) Blaine Fineness, m ² /gm	537	280 Min
(ASTM C 430) -325 Mesh, %	100.0	----
(ASTM C114) Limestone, max, %	2.5	5 Max
(ASTM C 191) Time of Setting - Initial (Vicat)	80	45 Min
(ASTM C 191) Time of Setting - Final (Vicat)	170	375 Max
(ASTM C 451) False Set, %	100	----
(ASTM C 185) Air Content, %	7.5	12 Max
(ASTM C 151) Autoclave Expansion, %	-0.03	0.80 Max
(ASTM C 187) Normal Consistency, %	29.8	----
(ASTM C 109) Compressive Strength, psi (MPa)		
1 Day	3323	1740 (12.0)
3 Day	4608	3480 (24.0)
7 Day	6078	----
28 Day (previous month)	7906	----

This cement meets the requirements of specification:

Alan Sabawi, Quality Control Manager

ASTM C150-09 Type III, Low Alkali

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

Federal Specification SS-C190/3 for Type III low alkali Portland Cement

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

ASTM C 1157 Portland Cement Type HE (MS)

AASHTO Practice R18 accredited laboratory