

LEHIGH

HEIDELBERGCEMENT Group

TECHNICAL SERVICES SALES & MARKETING

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PERMANENTE PLANT

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CEMENT TEST REPORT

Cement: Permanente Pronto Type II-V

Production Period: July 2011

Report Date: 8/17/2011

Standard Chemical Requirements ASTM C114	TEST RESULTS
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
Sulfur Trioxide (SO ₃), %	3.6
Loss on Ignition (LOI), %	1.1
Insoluble Residue, %	0.3
Alkalies (Na ₂ O equivalent), %	0.35
Tricalcium Silicate (C ₃ S), % ^a	63
Dicalcium Silicate (C ₂ S), % ^a	12
Tricalcium Aluminate (C ₃ A), % ^a	3
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
(ASTM C 452) Expansion @ 14 days, %	0.022
(ASTM C 204) Blaine Fineness, m ² /gm	537
(ASTM C 430) -325 Mesh, %	100.0
(ASTM C114) Limestone, % (max)	2.5
(ASTM C 191) Time of Setting - Initial (Vicat)	80
(ASTM C 191) Time of Setting - Final (Vicat)	170
(ASTM C 451) False Set, %	100
(ASTM C 185) Air Content, %	7.5
(ASTM C 151) Autoclave Expansion, %	-0.026
(ASTM C 187) Normal Consistency, %	29.8
(ASTM C 109) Compressive Strength, psi (MPa)	
1 Day	3323
3 Day	4608
7 Day	6078
28 Day (previous month)	7906

This cement meets the requirements of specification:

Alan Sabawi, Quality Control Manager

ASTM C150-09 Type II-V, Low Alkali
^a Adjusted per ASTM C-150-09 Section A1.6
 Federal Specification SS-C190/3 for Type II-V low alkali Portland Cement
 Caltrans Section 90-2.01 for Type III Portland cement
 ASTM C 1157 Portland Cement Type HE (MS)
 AASHTO Practice R18 accredited laboratory