

# LEHIGH

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### CEMENT TEST REPORT

**Cement:** Permanente Pronto Type II-V, Type III

Production Period: April 2012

**Report Date:** 5/16/2012

Standard Chemical Requirements ASTM C114	TEST RESULTS	TYPE II	TYPE V	Type III
Silicon Dioxide (SiO <sub>2</sub> ), %	21.7	20.0 Min	----	----
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), %	3.7	6.0 Max	----	----
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %	3.6	6.0 Max	----	----
Calcium Oxide (CaO), %	64.9	----	----	----
Magnesium Oxide (MgO), %	1.4	6.0 Max	6.0 Max	6.0 Max
Sulfur Trioxide (SO <sub>3</sub> ), %	3.5	3.0 Max	2.3B Max	3.5 Max
Loss on Ignition (LOI), %	0.9	3.0 Max	3.0 Max	3.0 Max
Insoluble Residue, %	0.2	0.75 Max	0.75 Max	0.75 Max
Alkalies (Na <sub>2</sub> O equivalent), %	0.34	0.60 Max	0.60 Max	0.60 Max
Tricalcium Silicate (C <sub>3</sub> S), % <sup>a</sup>	59	----	----	----
Dicalcium Silicate (C <sub>2</sub> S), % <sup>a</sup>	17	----	----	----
Tricalcium Aluminate (C <sub>3</sub> A), % <sup>a</sup>	4	8 Max	5 Max	15 Max
Tetracalcium Aluminoferrite (C <sub>4</sub> AF), % <sup>a</sup>	11	----	----	----
2 (C <sub>3</sub> A) + C <sub>4</sub> AF, %	19	----	25 Max	----
<b>PHYSICAL REQUIREMENTS</b>				
(ASTM C 1038) Expansion @ 14 days, %	0.004	0.020 Max	0.020 Max	0.020 Max
(ASTM C 452) Expansion @ 14 days, %	0.022	----	0.04 Max	----
(ASTM C 204) Blaine Fineness, m <sup>2</sup> /gm	530	----	----	280 Min
(ASTM C 430) -325 Mesh, %	99.5	280 Min	280 Min	----
(ASTM C114) Limestone, % (max)	0.0	5 Max	5 Max	5 Max
(ASTM C 191) Time of Setting - Initial (Vicat)	74	45 Min	45 Min	45 Min
(ASTM C 191) Time of Setting - Final (Vicat)	185	375 Max	375 Max	375 Max
(ASTM C 451) False Set, %	94	50 Min	50 Min	----
(ASTM C 185) Air Content, %	7.9	12 Max	12 Max	12 Max
(ASTM C 151) Autoclave Expansion, %	-0.02	0.80 Max	0.80 Max	0.80 Max
(ASTM C 187) Normal Consistency, %	29.6	----	----	----
(ASTM C 109) Compressive Strength, psi (MPa)				
1 Day	2698	----	----	1740 (12.0)
3 Day	3750	1500 (10.3) Min	1160 (8.0) Min	3480 (24.0)
7 Day	5058	2500 (17.2) Min	2180 (15.0) Min	----
28 Day (previous month)	7861	----	3050 (21.0) Min	----

This cement meets the requirements of specification:

Alan Sabawi, Quality Control Manager

ASTM C150-09 Type II-V, Low Alkali  
 ASTM C150-09 Type III, Low Alkali  
<sup>a</sup> 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

**Applicable ASTM C 150 Notes:**

**Note B:** There are cases where the optimum SO<sub>3</sub> (using Test Method C563) for a particular cement is close to or in excess of the limit in this specification. In such cases where properties of a cement can be improved by exceeding the SO<sub>3</sub> limit stated in this table it is permissible to exceed the values in the table, provided it has been demonstrated by Test Method C1038 that the cement with the increased SO<sub>3</sub> will not develop expansion in water exceeding 0.020% at 14 days. When the manufacturer supplies cement under this provision, he shall, upon request, supply supporting data to the purchaser.