

Manufacturer's Certification

We hereby certify that this test data, provided by Mojave, CA, USA, meets the standard requirements of ASTM C 150 specification for TYPE II and TYPE V cement. Additionally, these test results for Mojave Type II/V cement meets the requirements of Caltrans Standard Specification Sec. 90 paragraph 2.01. Following are the average chemical and physical data for the Production Period: August 2008

Chemical Analysis	TYPE II Requirements	TYPE V Requirements	Test Results
Silicon dioxide (SiO ₂), min, %	---	---	21.5
Aluminum oxide (Al ₂ O ₃), max, %	6.0	---	3.5
Ferric oxide (Fe ₂ O ₃), max, %	6.0	---	3.7
Magnesium oxide (MgO), max, %	6.0	6.0	2.3
Sulfur trioxide (SO ₃), max, % (Note 2)	3.0	2.3	2.7
Loss on ignition, max, %	3.0	3.0	1.8
Insoluble residue, max, %	0.75	0.75	0.43
Alkalies (Na ₂ O+0.658K ₂ O), max, %	0.60	0.60	0.57
Tricalcium silicate (C ₃ S), %	---	---	54
Tricalcium aluminate (C ₃ A), max, % (Note 3)	8	5	3
Tetracalcium aluminoferrite (C ₄ AF), %	---	---	11
C ₄ AF + 2 (C ₃ A), max, % (Note 3)	---	25	17
C ₃ S + 4.75*(C ₃ A), max, % (Note 4)	100	---	68
CO ₂ , %	---	---	0.8
limestone, max, %	5.0	5.0	1.9
CaCO ₃ in limestone, min, %	70	70	92.7
10 point moving average, % limestone	2.5	2.5	2.0
Physical Data			
Air content of mortar, max, %	12	12	7.5
Passing 45um (no. 325) sieve, %	---	---	97.3
Fineness, specific surface, min, m ² /kg (Note 4)	280/430	280/---	383
Average Blaine Fineness, (last 5 samples) (Note 4)	420	---	383
Heat of Hydration, C186, (cal/g) (Note 6)	---	---	81
Autoclave expansion, max, %	0.80	0.80	0.00
Compressive Strength, min, MPa, (psi)			
3 days	10.0 (1450)	8.0 (1160)	27.0(3915)
7 days	17.0 (2470)	15.0 (2180)	33.3(4833)
28 days	---	21.0 (3050)	43.6(6325)
Vicat, initial set, min.-max., minutes	45-375	45-375	142
C 1038, 14 day max, % expansion	0.020	0.020	0.006
False Set, final penetration, min, %	50	50	89
Caltrans 527-D, max. % expansion (Note 1)	0.010	0.010	0.005
Caltrans 527-D, max. % contraction (Note 1)	0.048	0.048	0.047

Apparatus and methods used in this laboratory have been checked by the Cement and Concrete Reference Laboratory of the National Institute of Standards and Technology. A copy of the report detailing their findings is available upon request. Major Oxides are analyzed by X-Ray Fluorescence Spectrometry.

Note 1: Caltrans Standard Specification, Sec 90, paragraph 2.01

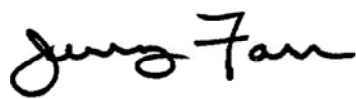
Note 2: ASTM C150, Table 1, Note D, The performance of the cement represented by this certificate has proven to be improved with SO₃ levels in excess of the

2.3% limit for Type V. The expansion, as measured by ASTM C1038, does not exceed the limit of 0.02% at 14 days.

Note 3: ASTM C150, Table 1, Note C, Does not apply when the optional sulfate resistance limit in Table 4 is specified.

Note 4: ASTM C 150, Table 3, Note F, Maximum average and Maximum single ample fineness limits do not apply if the sum of C₃S+4.75*C₃A is ≤ 90.

Note 5: ASTM C150, Table 1, Note H, For informational purposes only.



Jerry Farr, Director of Quality Control