Manufacturer's Certification

Report Date: 03-26-20

We hereby certify that CalPortland Type I/II Low Alkali Cement meets the standard requirements of ASTM C150 and AASHTO M85 specification for Type I and Type II cements. Additionally, CalPortland Type I/II Low Alkali Cement meets the optional requirement for low alkali (less than or equal to 0.60 total alkali). Reported are the average chemical and physical data for the lot.

Lot #: 2020-03-26

Type I / II Low Alkali Cement

Source: Asia Cement-Taiwan

	ASTM C150 and AASHTO M85 Requirements		Analysis
Chemical Properties	**Type I**	**Type II**	**Results**
Silicon dioxide (SiO_2), %	---	---	**20.98**
Aluminum oxide (Al_2O_3), max, %	---	6.0	**4.24**
Ferric oxide (Fe_2O_3), max, %	---	6.0	**2.75**
Calcium oxide (CaO), %	---	---	**62.77**
Magnesium oxide (MgO), max, %	6.0	6.0	**4.13**
Sulfur trioxide (SO_3), max, %	3.0	3.0	**2.97**
Loss on ignition (LOI), max, %	3.5	3.5	**0.76**
Insoluble residue (IR), max, %	1.5	1.5	**0.33**
Alkalies ($Na_2O+0.658*K_2O$), %	---	---	**0.59**
Tricalcium silicate (C_3S), %	---	---	**55**
Dicalcium silicate (C_2S), %	---	---	**19**
Tricalcium aluminate (C_3A), max, %	---	8	**7**
Tetracalcium aluminoferrite (C_4AF), %	---	---	**8**
CO_2, %	---	---	**0.24**
Limestone addition, max, %	5.0	5.0	**0**
$CaCO_3$ in Limestone, min, %	70	70	
Physical Properties			
Air content of mortar, max, volume %	12	12	**10**
Blaine Fineness, min, m^2/kg	260	260	**382**
Autoclave expansion, max, %	0.80	0.80	**0.06**
Compressive Strength, min			
1 Day, psi	---	---	**1810**
3 Day, MPa	12.0	10.0	**25.0**
3 Day, psi	1740	1450	**3630**
7 Day, MPa	19.0	17.0	**33.0**
7 Day, psi	2760	2470	**4795**
28 Day (from previous lot), MPa	---	---	**44.6**
28 Day (from previous lot), psi	---	---	**6470**
Vicat Setting Time, min-max, minutes	45 - 375	45 - 375	**114**

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 in accordance with ASTM C114.

Kevin Wolf - Director of Technical Services