



P20230122

CERTIFICATE NUMBER

January 22, 2023

DATE

Laboratory Test Certificate

PORTLAND CEMENT - TYPE I

Source: Asia Cement-Hualein Plant, Taiwan

Chemical (C114)

Item (%)	Value	Limit
Silicon Dioxide (SiO ₂)	20.2	
Aluminum Oxide (Al ₂ O ₃)	4.0	
Ferric Oxide (Fe ₂ O ₃)	2.99	
Calcium Oxide (CaO)	62.6	
Magnesium Oxide (MgO)	3.5	6.0 Max
Sulfur Trioxide (SO ₃)	2.8	3.0 Max
Sodium Oxide (Na ₂ O)	0.15	
Potassium Oxide (K ₂ O)	0.54	
Loss on Ignition (LOI)	2.66	3.5 Max
Insoluble Residue	0.57	1.50 Max

Physical Properties

Comp. Strength	Value	(Min.)
3 Days	3940 psi	1740 psi
	(27.1 MPa)	(12.0 MPa)
7 Days	5260 psi	2760 psi
	(36.2 MPa)	(19.0 MPa)
28 Days**	6520 psi	4060*psi
	(44.9 MPa)	(28.0*MPa)
Blaine Fineness:	4100 cm ² /g	2600 min.
Air Content:	7.7 %	12.0 %Max
Vicat C191 Init. Set:	155 min.	45 Min
Vicat C191 Final Set:	220 min.	375 Max
Autoclave Expansion:	0.04 %	0.80 %Max
Paste False Set:	87 %	50*% Min

Potential phase composition (%)	Value
C ₃ S	62.0
C ₂ S	11.1
C ₃ A	5.6
C ₄ AF	9.1
Alkali Equivalent (NaEq)	0.51

* - optional requirements , Table 4.

** - 28 Days Compressive Strength from previous month.

We certify that the above described cement, at the time of shipment, meets the standard chemical and physical requirements of ASTM C150-22 and AASHTO M85-22, Type I, low alkali (Table 1).

Cement Division

Office: 99-1300 Halawa Valley Street
Aiea, HI 96701
Phone (808) 532-3400

Daniel K. Paaaina III
Chemist