



Manufacturer's Certification

Report Date: 6/15/2020

We hereby certify that CalPortland Type I/II Cement meets the standard requirements of ASTM C150 and AASHTO M85 specification for Type I and Type II cements. Reported are the average chemical and physical data for the lot.

Lot #: 20-163

Type I / II Cement

Source: SsangYong, So. Korea

Chemical Properties	ASTM C150 and AASHTO M85 Requirements		Analysis	Limestone
	Type I	Type II	Results	Analysis
Silicon dioxide (SiO ₂), %	---	---	20.0	8.0
Aluminum oxide (Al ₂ O ₃), max, %	---	6.0	4.6	3.0
Ferric oxide (Fe ₂ O ₃), max, %	---	6.0	3.2	1.5
Calcium oxide (CaO), %	---	---	62.5	45.5
Magnesium oxide (MgO), max, %	6.0	6.0	4.1	3.0
Sulfur trioxide (SO ₃), max, %	3.0	3.0	2.8	
Loss on ignition (LOI), max, %	3.5	3.5	1.7	
Insoluble residue (IR), max, %	1.5	1.5	0.5	Base
Alkalies (Na ₂ O+0.658*K ₂ O), %	---	---	0.55	Cement
Tricalcium silicate (C ₃ S), %	---	---	56	58
Dicalcium silicate (C ₂ S), %	---	---	14	15
Tricalcium aluminate (C ₃ A), max, %	---	8	7	7
Tetracalcium aluminoferrite (C ₄ AF), %	---	---	10	10
CO ₂ , %	---	---	1.1	
Limestone addition, max, %	5.0	5.0	2.9	
CaCO ₃ in Limestone, min, %	70	70	86	
Physical Properties				
Air content of mortar, max, volume %	12	12	9	
Blaine Fineness, min, m ² /kg	260	260	413	
Autoclave expansion, max, %	0.80	0.80	0.05	
Compressive Strength, min				
1 Day, psi	---	---	2000	
3 Day, MPa	12.0	10.0	25.8	
3 Day, psi	1740	1450	3740	
7 Day, MPa	19.0	17.0	33.3	
7 Day, psi	2760	2470	4830	
28 Day (from previous lot), MPa	---	---	41.9	
28 Day (from previous lot), psi	---	---	6080	
Vicat Setting Time, min-max, minutes	45 - 375	45 - 375	122	

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