



Manufacturer's Certification

Report Date: 12/17/2021

We hereby certify that CalPortland Type MS cement, sourced as indicated below, meets the standard requirements of CSA A3001 specification for Type MS cement. Reported are the average chemical and physical data for the Lot # indicated below.

Lot #: 21-341

Type MS Cement

Source: SsangYong, So. Korea Kodiak Island

	CSA A3001 Requirements	Analysis	Limestone
Chemical Properties	Type MS	Results	Analysis
Silicon dioxide (SiO ₂), %	---	19.8	8.2
Aluminum oxide (Al ₂ O ₃), max, %	---	4.7	3.1
Ferric oxide (Fe ₂ O ₃), max, %	---	3.1	1.5
Calcium oxide (CaO), %	---	62.0	45.9
Magnesium oxide (MgO), max, %	5.0	4.0	3.1
Sulfur trioxide (SO ₃), max, %	3.0	2.7	0.0
Loss on ignition (LOI), max, %	3.5	1.5	
Insoluble residue (IR), max, %	1.5	0.55	Base
Alkalies (Na ₂ O+0.658*K ₂ O), max, %	0.60	0.58	Cement
Tricalcium silicate (C ₃ S), %	---	55	56
Dicalcium silicate (C ₂ S), %	---	15	15
Tricalcium aluminate (C ₃ A), max, %	8.0	7	7
Tetracalcium aluminoferrite (C ₄ AF), %	---	9	10
CO ₂ , %	---	1.1	
Limestone addition, max, %	5	3.0	
CaCO ₃ in Limestone, min, %	---	85	
Physical Properties			
Air content of mortar, max, volume %	---	9	
Retained 45um (#325) sieve, max %	28	2.9	
Blaine Fineness, min, m ² /kg	280	431	
Autoclave expansion, max, %	0.8	0.09	
Compressive Strength, min			
3 Day, MPa	14.5	25.3	
7 Day, MPa	20.0	33.1	
28 Day (from previous lot), MPa	26.5	42.5	
Vicat Setting Time, min-max, minutes	45 - 375	135	
A3004-C6 Expansion, max, %	0.050	0.037	

Kevin Wolf - Director of Technical Services