



## Manufacturer's Certification

Report Date: 10/24/2021

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

Lot #: **21-290**

**Type GU Cement**

Source: **SsangYong, So. Korea Global Hero**

	CSA A3001 Requirements	Analysis	Limestone
<b>Chemical Properties</b>	<b>Type GU</b>	<b>Results</b>	<b>Analysis</b>
Silicon dioxide (SiO <sub>2</sub> ), %	---	19.8	7.6
Aluminum oxide (Al <sub>2</sub> O <sub>3</sub> ), max, %	---	4.4	3.0
Ferric oxide (Fe <sub>2</sub> O <sub>3</sub> ), max, %	---	3.2	1.4
Calcium oxide (CaO), %	---	62.7	46.3
Magnesium oxide (MgO), max, %	5.0	4.2	3.3
Sulfur trioxide (SO <sub>3</sub> ), max, %	3.0	2.6	0.0
Loss on ignition (LOI), max, %	3.0	1.5	
Insoluble residue (IR), max, %	1.5	0.42	Base
Alkalies (Na <sub>2</sub> O+0.658*K <sub>2</sub> O), max, %	---	0.56	Cement
Tricalcium silicate (C <sub>3</sub> S), %	---	61	62
Dicalcium silicate (C <sub>2</sub> S), %	---	10	11
Tricalcium aluminate (C <sub>3</sub> A), max, %	---	6	6
Tetracalcium aluminoferrite (C <sub>4</sub> AF), %	---	10	10
CO <sub>2</sub> , %	---	1.0	
Limestone addition, max, %	5	2.7	
CaCO <sub>3</sub> in Limestone, min, %	---	85	
<b>Physical Properties</b>			
Air content of mortar, max, volume %	---	8	
Retained 45um (#325) sieve, max %	28	2.9	
Blaine Fineness, min, m <sup>2</sup> /kg	---	412	
Autoclave expansion, max, %	1.0	0.08	
Compressive Strength, min			
3 Day, MPa	10	24.5	
7 Day, MPa	17	32.5	
28 Day (from previous lot), MPa	---	41.9	
Vicat Setting Time, min-max, minutes	45 - 375	120	

**Kevin Wolf - Director of Technical Services**