

GGBS

A Truly Green and Low Carbon Cement –Complying with SS EN 15167:2008

EnGro's VCEM GGBS production complies with SS EN 15167: 2008 (BS EN 15167: 2006). Certificate of analysis is available upon request.

In addition, the high quality raw slag supply from the steel mills ensures that VCEM GGBS has more stable chemical constituents as compared to other mineral additives, such as fly ash and silica fume.

Proven Track Record:

GGBS has been reliably in used for more than 100 years. In 1865, GGBS was firstly used in Germany. In France, GGBS was used in the construction of Paris Metro as early as 1889. VCEM GGBS has more than 100 reference projects in both Singapore and overseas.

Featured Projects:

Singapore

- Thomson-East Coast (MRT) Line by LTA
- Marina Coastal Expressway (MCE)
- 8 @ Woodleigh (Condominium)
- Gardens by the Bay
- CDL: The Livia
- Oversea Union House
- Pasir Panjang Wharf Terminal
- Marina Bay Sands Integrated Resort
- Deep Tunnel Sewerage System (DTSS)
- JTC Summit
- Tuas Undersea Cable Tunnel
- MOE Building
- Suntec City

Overseas

- Beijing-Shanghai High-Speed Railway (China)
- Jinan Yanshan Flyover Bridge (China)
- The Rantambe Dam (Sri Lanka)

Test Results (typical):

Test Items	SS EN15167-1: 2008 Requirements	Test Results
Fineness (m ² /kg)	≥275	430 – 460
Initial Setting Time (Minutes)	Not more than twice as long as setting time of test cement on its own	140 – 170
Activity Index (%)	7 days	>45
	28 days	>70
Magenesium Oxide as MgO, %	Max. 18	9.0 – 11.0
Sulphate as SO ₃ , %	Max. 2.5	1.3 – 1.6
Sulphide as S, %	Max. 2.0	1.0 – 1.3
Loss On Ignition, %	Max. 3.0	0.15 – 0.18
Chloride as Cl ⁻ , %	Max. 0.10	<0.03
Moisture Content, %	Max. 1.0	<0.15
CaO+MgO+SiO ₂ , %	Min. 67	76.0 – 84.0
(CaO+MgO)/SiO ₂ , %	Min. 1.0	1.25 – 1.40

Note: Test results were provided by TÜV SÜD PSB Lab.

EnGro's ground granulated blast furnace slag (GGBS) under the "VCEM" brand name is a pioneer and leading brand which has established itself as a superior cementitious material that can be used as partial substitute of conventional cement for producing high performance concrete. Presently, GGBS associate plants in China and Korea have a combined annual GGBS production capacity of 7.1 million tons and would rise to 9.5 million tons by 2013.

The raw material for GGBS is obtained by quenching molten iron blast furnace slag (a by-product of steel making) in water or stream. Subsequently, GBS is dried and then ground into the desired fineness. VCEM GGBS has the same chemical constituents as Portland cement, only with slightly difference in proportion. The main hydration product of GGBS is the same as Portland cement, that is, *calcium-silica-hydrate*, which is the major chemical compound providing strength in hardened cement concrete.

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Product Data Sheet Rev.01 (SEP 18)



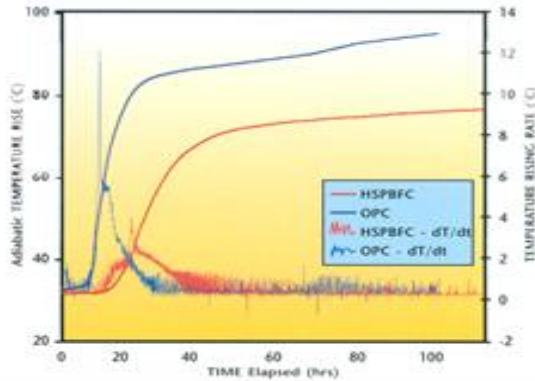
Identification Number: 022-003-0205
Eco Friendly Building Material
Recycled Content:-100%
Carbon Emission Value: 60 kg/ton

GGBS

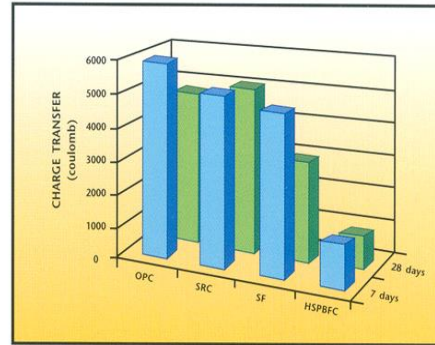
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Benefits:

Reduce Thermal Cracking

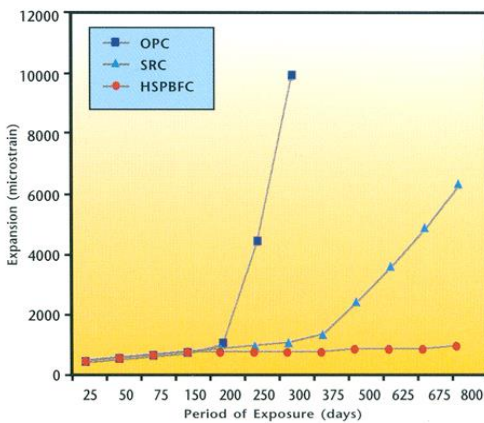


Resistance to Chloride Attack

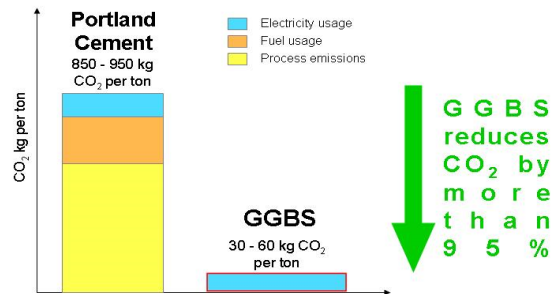


OPC: Ordinary Portland Cement.
HSPBFC: High Slag Blast Furnace Cement containing 65% GGBS.
SRC: Sulfate Resistance Cement.
SF: Silica Fume.

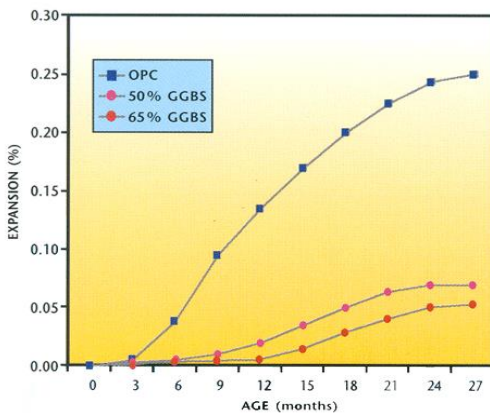
Resistance to Sulfate Attack



Reduce Carbon Footprint



Resistance to Alkali-Silica Reaction



Consistent Quality

VCEM is produced by sourcing the high activity index raw slag from steel mills and it is then carefully ground using our state-of-the-art vertical mill. This results in a superior product in terms of its consistent fineness with well-graded particle size distribution and high hydration reactivity requiring less water demand for standard consistency.