CemPlus™

Slag Cement

Sustainable solutions for greater strength and durability in concrete

Votorantim Cimentos

ST MARYS
St Marys Cement

WHY CHOOSE SLAG CEMENT?

St Marys Cement CemPlus™ Slag is a hydraulic cement produced by grinding granulated blast furnaced slag. It is used to replace a portion of Portland cement to achieve the desired concrete properties required for the project. It is a recovered industrial by-product of an iron blast furnace. Molten slag diverted from the blast furnace is rapidly chilled, producing glassy granules that possess desired reactive cementitious characteristics. These granules are then reduced in size to a fine powder in a grinding mill, similar to Portland cement, to meet the requirements of ASTM C989, AASHTO M302, and CSA A3001.

SUSTAINABILITY

There are a number of benefits associated with the use of CemPlus™ in concrete mixtures:

- Reduce the amount of virgin material used to manufacture concrete
- Reduce disposal and increase use of a recovered industrial by-product
- Reduce embodied energy and greenhouse gas emissions
- Increase concrete reflectivity and reduce the heat island effect
- Improve on performance and life-cycle attributes of concrete in service
- Help achieve credits with sustainability rating systems and green building codes

REDUCED PERMEABILITY AND INCREASED RESISTANCE TO CHLORIDES AND OTHER AGGRESSIVE CHEMICALS

CemPlus in concrete produces a denser structure with reduced porosity. CemPlus use in concrete has been shown to dramatically reduce permeability.

This characteristic leads to more durable concrete and helps to protect reinforcing steel from chlorides, increasing the service life of structures exposed to severe environments.

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INCREASED RESISTANCE TO SULPHATE ATTACK

The use of CemPlus in concrete exposed to sulphates (in ground water, soil, waste water or animal waste) improves the resistance to sulphate attack by reducing the reactive elements in the concrete. Tests have shown CemPlus replacement levels of 25% to 65% provide performance equivalent to sulphate resistant Portland cements (replacement dependent on base cement composition).

REDUCED HEAT OF HYDRATION

At replacement levels of 40% to 80%, CemPlus reduces the heat of hydration significantly. This is beneficial in concrete used for mass applications such as dams, mat foundations and large bridge piers, where the generation of heat and associated stresses are major concerns.

A WHITER BRIGHTER FINISHED APPERARANCE

The use of CemPlus has advantages in architectural concrete. Concrete that contains CemPlus cures to a very light grey or white surface that will enhance the appearance of any structure. Brighter hues of colors are easily achieved. Increased brightness and reflectivity permit using less lumens for lighting to create a safer environment.

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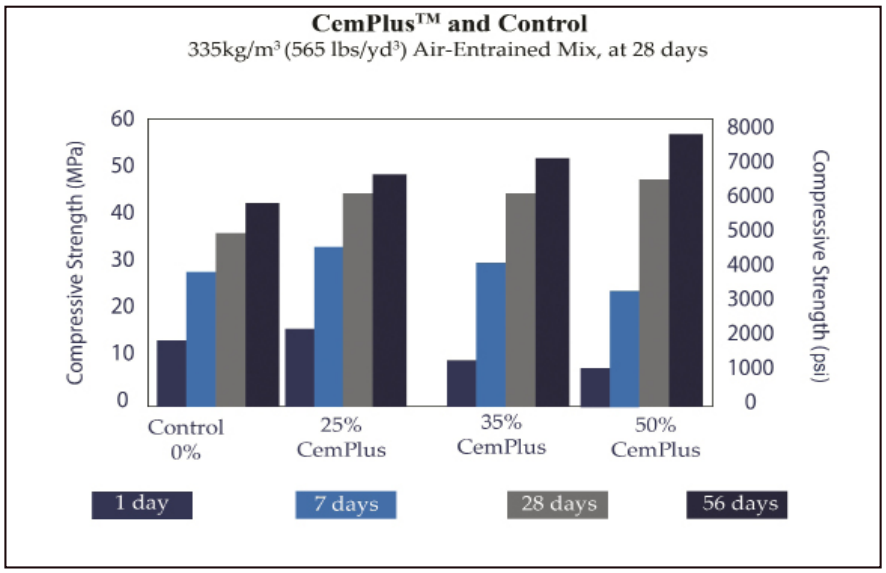
HIGHER 28-DAY COMPRESSIVE AND FLEXURAL STRENGTH

CemPlus in concrete may increase the compressive and flexural strengths at 28 days and later ages, as shown in this graph. Significantly higher ultimate compressive strengths can be achieved with the correct mix proportions.



IMPROVED WORKABILITY, FINISHABILITY AND PUMPABILITY

CemPlus improves the workability of concrete. This is due to the smooth, dense surface characteristics of the slag cement particles, which are ground slightly finer than normal Portland cement. Pastes containing CemPlus are more fluid than those made from Portland cement alone, resulting in better workability and easier pumping and placing.

INCREASED RESISTANCE TO ALKALI-SILICA REACTIONS (ASR)

The use of CemPlus in concrete containing reactive aggregates improves the resistance to ASR by reducing the available alkalis in the concrete and decreasing permeability. Standardized accelerated testing using potentially reactive aggregate has shown that CemPlus replacement levels of 25% to 50% reduce 14 day expansions in specimens to below 0.10%. (Required replacement levels dependent on aggregate.)

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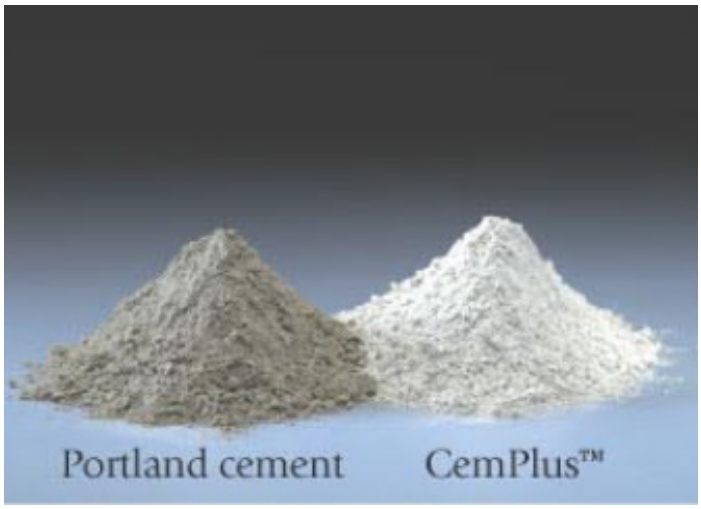
THE FINE PRINT ....



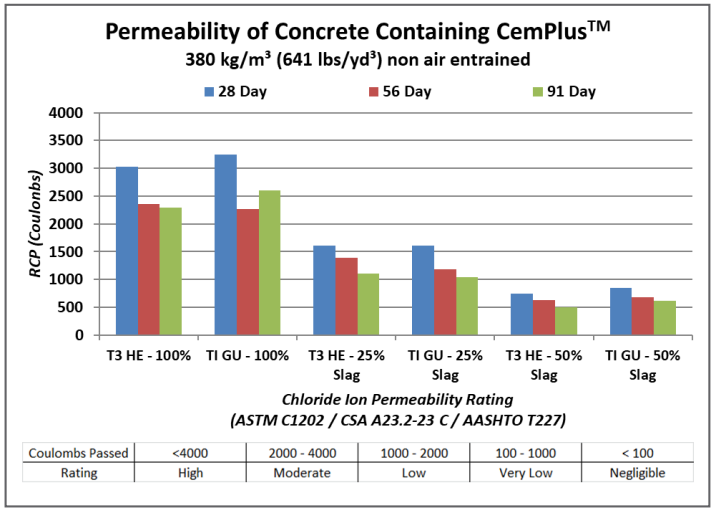
- CemPlus conforms to CSA A3001, ASTM C989 and AASHTO M302

- At temperatures above 23° C (73° F), concrete containing CemPlus replacement over 25% may have a longer time of set compared to concrete containing 100% normal Portland cement which is advantageous during the peak construction season. At placement temperatures between 0°C (32°F) and 10°C (50°F), setting times can be considerably longer when compared to 100% Portland cement concrete and standard cold-weather practices should be followed.

- To provide the concrete producer with the greatest flexibility to meet various job requirements, CemPlus is produced as a separate material to be blended with regular Portland cement at the batch plant. It is delivered, stored and handled in the same manner as Portland cement.

- CemPlus hydration consumes calcium hydroxide, present in concrete as it hydrates. By reducing the amount of calcium hydroxide remaining in the concrete and by impeding the infiltration of moisture, CemPlus reduces the occurrence of efflorescence.

- The reduced permeability of concrete containing CemPlus is shown in these "Chloride Ion Penetration" test results, tested according to ASTM C1202 and CSA A23.2-23C. A decrease in the coulomb reading as the replacement level of CemPlus™ increases, is typical.



Coulombs Passed	<4000	2000 - 4000	1000 - 2000	100 - 1000	< 100
Rating	High	Moderate	Low	Very Low	Negligible

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St Marys Cement has an experienced technical services department ready to provide assistance regarding the use of CemPlus slag cement in concrete.

For more information or specific needs such as Environmental Product Declarations (EPD's), Safety Data Sheets, and Product Data Sheets, contact your sales or technical services representative, or visit the St Marys Cement website at www.stmaryscement.com.

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