

PRECAST CONCRETE

Precast concrete is a concrete product manufactured and cured in a casting facility and then shipped to a jobsite for installation.

PRESTRESSED CONCRETE

As with precast concrete, prestressed concrete is a concrete product manufactured and cured in a casting facility and then shipped to a jobsite for installation. Unlike precast concrete prestressed concrete members undergo additional manufacturing processes—i.e. pre-tensioning of the steel strands—to increase the load capacity of the element.

WHAT CONCRETE PROPERTIES ARE IMPORTANT IN PRECAST / PRESTRESSED CONCRETE?

Some of the properties that are important in precast concrete are:

- Strength
- Durability
- Workability
- Color
- Consistency

Slag cement can improve each of these properties.

HOW DOES SLAG CEMENT AFFECT STRENGTH?

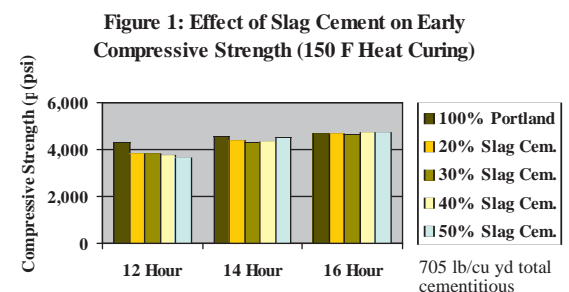
Early strengths are important to precast and to prestressed manufacturing. Heat curing is frequently used in both operations. Slag cement responds well to heat curing and produces early strengths comparable to, or better than, plain portland cement mixes. Without heat curing, early strength may be less than plain portland cement concrete members. Ultimate compressive strengths will be higher using slag cement. Engineering requirements and plant processes will influence mix proportions.

WHERE ARE PRECAST AND PRESTRESSED CONCRETE PRODUCTS USED?

- Building, housing, landscape, and specialty products
- Sanitary and storm water products
- Water and wastewater products
- Transportation products
- Utility, industrial and farm products



Precast/prestressed elements at the Philadelphia Airport parking garage incorporating slag cement.



Slag cement can improve both the plastic and hardened properties of precast and prestressed concrete.

Slag cement reduces concrete permeability, which in turn increases resistance to chloride intrusion.

PRODUCING PRECAST AND PRESTRESSED CONCRETE

HOW DOES SLAG CEMENT AFFECT DURABILITY?

Properly proportioned slag cement mixtures produce more durable precast/prestressed concrete. Slag cement improves durability in the following ways:

- Reduces permeability
- Increases resistance to chloride intrusion, thus improving corrosion resistance
- Reduces susceptibility to sulfate attack
- Mitigates alkali-silica reactivity

By improving the durability of the concrete, the service life of the concrete element may be increased.

HOW DOES SLAG CEMENT AFFECT WORKABILITY?

Slag cement improves the workability of concrete due to its fine grind and glassy structure. Enhanced workability benefits placing, compaction, and finishing of the concrete. The resulting concrete elements may have fewer surface voids and improved consolidation. Slag cement has also been used effectively in the design of self-consolidating concrete mixtures.

PROPORTIONING PRECAST/PRESTRESSED CONCRETE MIXTURES WITH SLAG CEMENT

Precast/prestressed manufacturers who have successfully incorporated slag cement in their products have used slag cement in ranges from 20 to 50 percent of cementitious material.

As with all concrete mixtures, trial batches should be performed to verify concrete properties. Results may vary due to a variety of circumstances, including temperature and mixture components, among other things. You should consult your slag cement professional for assistance. Nothing contained herein shall be considered or construed as a warranty or guarantee, either expressed or implied, including any warranty of fitness for a particular purpose.



HOW DOES SLAG CEMENT AFFECT CONSISTENCY?

Slag cement is one of the most consistent materials used in concrete. Since it is made in a manufacturing process, chemical composition and particle size are controlled during its production, ensuring not only conformance with specifications, but also low variability from shipment to shipment, and even from source to source. Slag cement does not contain carbon and maintains a consistent particle size, thus ensuring a stable air void system. Precast manufacturers can depend on slag cement to help reduce the variability of their concrete materials.

HOW DOES SLAG CEMENT AFFECT COLOR?

Slag cement is lighter in color than portland cement. Elements made with slag cement will therefore have a lighter finished color. The higher the percentage of slag cement used, the lighter the color will be. This provides greater visibility of the elements and potentially improved safety.



Precast tilt-up elements incorporating slag cement are made on the jobsite.

Enhanced workability with slag cement concrete results in fewer surface voids and improved consolidation around reinforcing steel and prestressing tendons.



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About the Slag Cement Association...

The Slag Cement Association is the leading source of knowledge on blast-furnace slag-based cementitious products. We promote the increased use and acceptance of these products by coordinating the resources of member companies. We educate customers, specifiers and other end-users on the varied attributes, benefits and uses of these products.

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