

Engineers, architects, and specifiers have long used slag cement in major projects to achieve improved concrete performance. These performance enhancements are becoming more important to builders of residential homes, and their owners. The durability, versatility, and beauty of concrete are vital to residential homes, and slag cement is playing an increasingly larger role in this segment.

Where Can Slag Cement Be Used in Residential Construction?

Slag cement can be used in almost any residential concrete application. It has been used in footings, basement walls, basement floor slabs, side-walks, driveways, and garages. Slag cement has been used in mixtures for above grade insulating concrete form (ICF) concrete walls for safe, energy-efficient homes as well. In addition to these concrete applications, slag cement is also used in masonry construction.

What Are the Benefits Of Slag Cement In Residential Construction?

- Improved workability
 - Easier placement
 - Improved consolidation
 - Decreased honeycombing
 - Improved finishing characteristics
- Lighter color
 - Aesthetically pleasing
- Smoother surfaces
 - Fewer blemishes
 - More uniform finish
- Long service life
 - Improved strength
 - Resistant to sulfate attack
 - Mitigates alkali silica reaction
 - Reduced permeability

Slag cement is preferred in decorative concrete. Because of its lighter base color, colors may appear more vibrant in integrally colored and stamped concrete. Concrete containing slag cement can be acid etched and stained as well.

Does Slag Cement Affect the Construction Process?

Slag cement has been used extensively in residential construction with little or no impact on construction processes. Wall forms can usually be removed on the same schedule as other mixtures. When backfilling a foundation, care must be taken by the excavator to make sure walls are not subjected to excessive pressures from machinery and backfill material. The same is true in walls containing slag cement.



Self-consolidating concrete for residential floor slab using 50% slag cement, 50% portland cement.



Decorative residential concrete with 25% slag cement: Interior acid stained concrete (top) and exterior stamped and colored concrete (bottom).



Figure 1: Oceanfront residence used 40% slag cement



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Finishing of flatwork requires proper timing by finishers before the operations are begun. In cooler temperatures, the timing of the operations may be delayed. Flatwork crews should avoid premature finishing. Lower water content, accelerators or adjusted mixture proportions can help address any delays in time of set if they are anticipated.

Will Slag Cement Be Durable In Exterior Applications?

Exterior concrete containing slag cement has shown good durability in severe conditions. Various mixture proportions have performed well in a wide range of environments. To assure good performance in cold environments, concrete mixtures should be designed for the appropriate Exposure Classification. ACI 332 identifies concrete that is exposed to moisture with the potential of being in a saturated condition during freezing and thawing conditions to be either Exposure Class RF2, RF3 or RF4. These Classifications require concrete mixtures (proportioned with or without slag cement) to comply with Table 5.1.1 requirements for w/cm ratio, compressive strength, and additional requirements described below:

- Adequate air void system for the specific weathering region
- Maximum w/cm ratio of 0.45
- Minimum 28-day compressive strengths:
 - 4500 psi for RF2 and RF3
 - 5000 psi for RF4
- Correct finishing practices
- Proper curing, in accordance with CIP 11 (footnote 2)
- Effective application of a breathable sealer

References

1. ACI 332-20, "Code Requirements for Residential Concrete and Commentary", Tables 5.1.1 and 5.3.2 Concrete Design Requirements for Exposure Categories and Classes, American Concrete Institute, Farmington Hills, MI, 2020.
2. CIP 11, "Curing In-Place Concrete", National Ready Mixed Concrete Association, Alexandria, VA, 2017.

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.