

NSSGA INSTA-GUIDE

The National Stone, Sand and Gravel Association designed the NSSGA INSTA-GUIDES to provide the industry salespeople with a simple, basic and instant overview of sales issues within the industry. The NSSGA INSTA-GUIDES will show you where to find detailed and expanded background information highlighting a particular selling topic.

Topic #2 Selling Aggregate for Use in Portland Cement Concrete

This INSTA-GUIDE will:

1. Profile aggregate in Portland Cement Concrete.
2. List aggregate performance.
3. Cite optimal concrete aggregate characteristics.
4. Highlight the handling and storage of concrete aggregate.
5. Provide more detailed Portland Cement Concrete references.

1. **Aggregate in Portland Cement Concrete (PCC)**

Proper proportioning of both fine and coarse aggregate in PCC is critical to PCC performance since fine/coarse aggregate occupy between 60 – 75% of the volume of the concrete mixture and up to 85% of the weight! Quality aggregate is a must if the concrete producer is to produce a quality product and a positive bottom line. While ready-mix concrete is likely the first concrete to come to mind, there are several other types of concrete manufacturers that depend on quality aggregate, including:

- A. Masonry Block Producers
- B. Prestressed Concrete Producers
- C. Precast Concrete Producers

2. **Concrete aggregate must possess** certain qualities and characteristics for optimal performance of the concrete. For instance, the aggregate must be:

- A. Clean (free of excessive amounts of fines and other deleterious substances).
- B. Hard (must not contain organic materials, silt, coal, lignite, clay, iron, shale, chert, oolitic stone or other soft similar products).
Cleanliness and hardness are key because soft, friable particles can often break down during the batching or mixing of the concrete. Such a breakdown will weaken the concrete and when exposed to the freeze-thaw cycle, these particles may pop out or lift from the concrete surface.

3. **Optimal Concrete Aggregate Characteristics**

Optimal aggregate performance can be achieved by focusing on seven key areas as defined by the noted ASTM reference numbers.

| Feature | Advantage | Benefit |
|---|--|---|
| Gradation | Several sizes available | Improved workability |
| Specific gravity | Lower specific gravity, higher volume per ton | Use less material per cubic yard if the specific gravity is lower |
| Cubicle shape versus flat and elongated | Control bleeding, higher strength | Lower cost, better product to place |
| Consistency | No variation for the ready-mix | Economies in cement |
| Freeze thaw resistance | No pavement pop-outs | No repair or tear out cost* |
| Chemical stability | No deterioration of the concrete in use or premature failure | No repair or tear out cost* |
| Deleterious matter | No deterioration of the concrete in use or premature failure | No repair or tear out cost* |

* Lower life cycle cost

4. **Handling and Storing**

When handling and storing concrete aggregate, here are four points to remember:

- A. Minimize segregation. Avoid high, cone-shaped stockpiles.
- B. Don't allow stockpile equipment on the aggregate stockpile because the concrete aggregate may break down, the gradation may change and/or foreign particles may be introduced.
- C. Separate the stockpile from other materials to avoid contamination and to maintain the integrity and gradation of the concrete aggregate.
- D. Watch out for extreme exposure to the weather. Be sure to mist during extreme heat, cover during freezing and protect from high wind.

5. **Portland Cement References**

- A. NSSGA's **The Aggregate Handbook**, Chapter 3
- B. PCA's **Design and Control of Concrete**
- C. NRMCA's **#159—Concrete Plant Operators Manual**
- D. ASTM Standards relating to aggregate and concrete
- E. State specification manuals
- F. ACI references