

CONCRETE COLOR



This Guide explains the basics of producing high quality colored concrete and the how-to's for maximizing surface appearance. The Guide shares "Tips of the Trade" that are specific to colored concrete, but does not provide a complete guide to concreting. Observe applicable building codes, project specifications, appropriate safety procedures and follow good industry practices for concrete construction.

A Contractor's Guide to Davis Colors™

Use Davis Colors to produce beautiful, colored concrete walks, driveways, patios, and other pavements and structures. Davis Colors have been "Setting the Standard for Concrete Colors" since 1952. They are easy to use, durable, economical, and feature:

- Pure concentrated pigments, specially processed for mixing into ready-mix concrete.
- Meet or exceed ASTM C979 Standard: *Pigments for Integrally Colored Concrete*
- Lightfast, alkali-proof, weather-resistant, and long-lasting.
- Available in 40 standard colors and a wide spectrum of custom colors.
- Mix-in colors save labor and time.
- Accepted by architects, builders and homeowners everywhere.
- Available from ready-mix suppliers in your community.
- Exclusive Mix-Ready® bags are the easiest and cleanest way to add color.
- Color cards, sample kits, and sales literature help you sell more jobs and earn more profits.



Consistency - the key to success

Consistency in materials and craftsmanship is the key to color uniformity. Follow the tips described in this Guide, allow extra time for placement and finishing, and above all, finish evenly and with care for beautiful colored concrete.

How to order

Your favorite ready-mix suppliers are probably Davis dealers. If not, tell them to get with it! Concrete can be ordered with any of 40 standard colors already mixed in. For custom colors or specified colors, your Davis dealer can call upon Davis Colors to match almost any color your customer desires. Contact Davis Colors or visit www.daviscolors.com for the names of nearby suppliers.

Adding Davis Colors

Ready Mix concrete suppliers use the Chameleon™ bulk handling system or Mix-Ready® disintegrating bags to add color to concrete. Mix-Ready® bags are tossed into the mix without opening or pouring.

While it's easiest to order concrete with the color already mixed-in, sometimes it makes sense to add color yourself. Mix-Ready® disintegrating bags make adding Davis Colors clean and easy to do. Just toss unopened Mix-Ready® bags directly into the concrete mixer. Mix-Ready® bags travel deep into the mix and disintegrate under mixing action, releasing pigments to disperse uniformly. You'll stay cleaner and there won't be a bunch of empty bags to clutter the job site.

Follow mixing instructions printed on the bag or request a Mix-Ready® Data Sheet from your Davis dealer. Davis Colors are added by weight in proportion to the content of cement in each cubic yard. Mix rates are listed on the Davis Color Selector™.

Add the corresponding weight of Mix-Ready® bags and mix at charging speed for at least five minutes (10 minutes for pea-gravel mixes).

In mixes with small aggregate or batches with short mixing duration, Mix-Ready® bags may not completely disintegrate. In sand-blasted or exposed aggregate finishes, use small bag sizes (15 lbs. maximum) or open bag and pour color normally.

The Chameleon™ is a computer-controlled automatic color dosing system that improves color accuracy, and handling efficiency.



Weather

Remember, "Consistency is Key." Even weather conditions have to cooperate.

- Schedule placement and finishing work to minimize exposure to hot sun before curing materials can be applied. Postpone color concreting until windy conditions pass. Don't concrete if rain, snow or frost is in the forecast.
- Dark or black-colored concrete will be exposed to additional heat during sunny, dry conditions. Provide extra curing protection to prevent thermal cracking.
- Concrete made from the same supplier can cure to different colors if pouring or curing takes place under different climates. Concrete temperature should be maintained between 60°F and 80°F in most applications for proper hardening to occur during the crucial first days.
- Temperature also affects the amount of water required to make the mix workable. In cool temperatures, it takes less water to get a workable mix. Variations in water-cement ratio have a significant effect on concrete color.

Mixing

"Consistency is Key" with mixing, too.

- Trucks should be scheduled for consistent mix times from plant until discharge. Allow no more than 1-1/2 hours between batching and placing.
- Specify a 4" slump. Slump greater than 5" should definitely be avoided unless a water-reducing or superplasticizing admixture is added by the concrete supplier. Low water content (water-cement ratio) minimizes shrinkage and cracking, maximizes hardness and promotes a richer, darker concrete color.
- Specify air content range of 5 to 7% for improved workability and durability. (In mild climates, this may be unnecessary. Check with your ready-mix supplier.)
- Specify the largest size of coarse aggregate usable to keep water content low. Get the ready-mix supplier's assurance that aggregates are non-reactive.
- Don't allow the addition of calcium chloride set accelerator. It causes discoloration.

Mix-Ready® bags:

Toss in and mix.

No opening

required.



Avoiding problems with colored concrete

Discoloration: Despite best efforts, minor surface discoloration can still occur. As with all natural materials, variation is an accepted feature of concrete whether colored or not. Discuss this with your customer while designing the job to avoid misunderstandings later. Can the customer tolerate natural variations, or is a uniform as-if-painted appearance expected? Showing samples of project photographs provides an excellent opportunity to discuss expectations and to promote your services and extra finishing options. On large or complex jobs, make a mock-up for customer approval before beginning the project. Then, follow the tips in this Guide for beautiful colored concrete.

Efflorescence: Efflorescence is a salt deposit that forms on concrete. It causes unsightly white stains which can be particularly objectionable on colored concrete. Efflorescence forms when water migrates through concrete, dissolves soluble compounds (calcium hydroxide), and evaporates, leaving the solids on the surface. Water, concrete permeability and soluble content determine how much and when efflorescence will occur.



Subgrade

Consistency applies to the subgrade which has to support the weight of the slab and loads placed on it.

- Subgrade must be uniformly graded, compacted and dampened. Do not place concrete if subgrade has standing water, hard or soft spots, ice, frost or muddy areas.
- Add a 2-3" layer of sand, gravel or crushed stone and compact with vibrating equipment.
- Grading should be sloped so that water drains away from the slab.
- If a vapor barrier is used, a layer of uniformly damp sand should be placed over the barrier to minimize risk of cracking. Overlap sheets and tape any holes in the barrier.

Forms and reinforcement

- For slabs, formwork should be positioned to achieve uniform slab thickness. American Concrete Institute (ACI) standards for reinforcement and joint placement should be followed to control cracking.
- There are additional considerations for vertical formwork or tilt-up. Consult a Davis dealer or request a Davis Colors Specifier's Data Sheet for more information.

Placing

- Prevent segregation of mix ingredients. Place concrete near its final location and move it with shovels. Don't move by vibrating.
- Protect adjacent slabs and structures from splatters with plastic sheets.
- Water added at job-site to mixer or pumps will cause color to pale. Keep additions to a minimum and consistent among loads. Don't use wet finishing tools, brooms or sprinkle water on the surface.

Control efflorescence by mixing with low water/cement ratio, using curing compound, and designing for less permeability. Seal concrete against water penetration and leaks. Keep de-icing salts away from concrete which is not fully cured. Efflorescence is easy to remove with water wash if treated early. If not, it converts to calcium carbonate which is removed with a dilute acid wash that will affect the surface appearance.

More Information: For more information on good concrete construction practices, contact your ready-mix supplier, Davis Colors™, or the organizations listed below:

American Concrete Institute 248/848-3700
 Concrete Construction Publications 630/543-0870
 National Ready Mixed Concrete Association 301/587-1400
 Portland Cement Association 847/966-6200

Finishing

Consistency in finishing pays off big in quality colored concrete. The wide variety of finishes you can apply shows off your craftsmanship and commands a premium for your extra effort. For color uniformity, remember:

- Bull float after striking off the slab. Skip jitterbugging (tamping) unless slump is 1" or less. To reduce discoloration, use wood bull floats and darbies, not magnesium.
- Wait for bleed water "sheen" to disappear before troweling.
- Do not over trowel or start troweling late. This leads to burns and dark spots.
- Do not sprinkle the surface with cement or with the Davis Colors powder, which is designed for mix-in coloring only.
- Don't fog the colored concrete with water or add water to tools or brooms. Adding water causes the surface to pale or discolor.
- A broom, rotary or textured finish will produce optimum color uniformity. A super-hard, dark, slippery-smooth finish is made by extended troweling. Trowel with care! The potential for discoloration (darkening) rises as troweling time increases. An easy way to uniform color is to skip troweling; just float and broom or use swirl finish. Follow with effective curing. Screenshot finishes also work well.
- For more information on creating finishes, see *Finishing Concrete Slabs with Color and Texture* by the Portland Cement Association or visit our web-site www.daviscolors.com.

Curing

Curing is one of the most important and often the most neglected aspects of quality concrete construction. Uneven curing = uneven drying = uneven color. Poor curing contributes to shrink-age cracks, dusting and surface deterioration.

- Apply curing compound as soon as the surface will not be damaged by the application. (Salt finish is an exception. See back page)
- If sawcutting is used for control joints, it should take place before application of curing materials. Thoroughly rinse all cutting residue off the surface to prevent stains.
- Apply a membrane-forming curing compound formulated for colored concrete. We recommend our W-1000 Clear™ or Color Seal™.
- Curing with water sprinkling, membranes, paper, sodium or fluoro silicate-type hardeners and non-approved compounds can cause discoloration. If water is used to cure, a lighter color is likely; the water must be clean, free of salts, and fogged using spray tips made for this purpose.



**Convenient
 Mix-Rate™
 calculator is
 available to help
 calculate mix
 requirement.**

As these uncolored slabs show, discoloration is possible in concrete whether colored or not.



Entrapped Moisture



Cement Color Varies



Poor Subgrade Quality



Old vs. New

Colored Concrete Finishes

Paving and floors can be finished with pattern-stamped, broomed, troweled, exposed aggregate, salt-finished, sand-blasted, or many other visually appealing textures. Cast-in-place, precast and tilt-up structures can be textured with sand-blasting, bushhammering, grinding, polishing, special forms or form liners. The combinations and possibilities are endless. Here are just a few:



Broomed

Made by pulling special brooms across stiff, freshly floated or troweled surface. For variety, broom texture can be heavy or light, and in straight or wavy lines.



Stamped

A powder release agent or plastic sheet is placed on the colored concrete surface after floating. Special stamping tools are pressed into the concrete to create a pattern and then removed. Follow recommendations of stamping tool manufacturer.



Salt Finish

Rock salt is pressed into the surface after finishing. After 24 hours, the salt is washed away with water and a brush. Pay attention to remove all traces of salt. Allow surface and pockets to dry before applying curing compound.



Exposed Aggregate

Aggregate is exposed by "seeding" the fresh concrete with aggregate. Or aggregate can be exposed by removing the surface cement "paste" by using a high-pressure water wash, sand blasting, grinding, bushhammering, or spraying a surface set-retarding compound. Exposure level can vary from barely revealing fine aggregate ("brush") or up to 1/3 the diameter of coarse aggregate ("heavy"). Aggregates can be colored or sparkling, fractured or smooth.



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Available At:



W-1000 Clear™ cure & seal and Color Seal™, which is tinted in a slab-matching color, are made specifically for curing and sealing colored concrete.

