

Placing Integral Colored Concrete

Tips and Techniques for Success

■ Integral Color Placement Guide P-422 ■



Protect with Scofield Concrete Cures & Sealers

Scofield sealers protect the surface, enhance the appearance of colored concrete, and may provide protection against contamination and chemical attack by imparting a film-forming layer on the surface of the concrete. Consult a Scofield Concrete Cures & Sealers Guide.

Placing concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete takes great care and expertise. Use this guide as a resource to help ensure that your integral colored concrete turns out vibrant, beautiful, and trouble free.



BATCHING CHROMIX® G ADMIXTURES

CHROMIX® G Admixtures for Color-Conditioned® Concrete are free-flowing concentrated pigment granules designed to permanently color concrete and other cementitious materials. They can be poured directly into concrete mixes, conveyed by gravity feed or pneumatic equipment, or pre-dispensed into disintegrating bags that can later be added directly to the concrete mix as a single unit.

CHROMIX® G Admixtures can be used to color cast-in-place, precast, and dry-cast concrete floor slabs, walls, steps, sidewalks, curbs, columns, arches, blocks, pavers, and other decorative objects.



CONCRETING GUIDELINES

CHROMIX® G Admixtures for Color-Conditioned® Concrete are designed to have minimal effect on concrete plastic and hardened properties, and to minimally interact with other concrete admixtures. Additional water, about 10% of the CHROMIX® G Admixtures used, may be needed to compensate for water absorbed by the granules. This amount of water will be less if water reducing admixtures are part of the mix design. As all chemical admixture interactions cannot be predicted, always test final mix designs with actual materials to be used, and perform a jobsite test sections.

RECOMMENDED DOSAGE

Color selection will determine the ratio of base colors needed, and color saturation, and intensity will determine the amount of granules required. Typical dosages range between 0.2 to 10.0 pounds of granules per 94 pound sack of cement. If supplementary cementitious materials such as fly ash or blast-furnace slag are used in the mix, their weight must be added to the weight of the cement when determining the correct dosage.

MIXING

CHROMIX® G Admixtures for Color-Conditioned® Concrete should be added first with dry materials and wet drum - on short loads concrete added first and color dispensed on top of load. Typically, this will take at least 5 minutes and 130 drum revolutions at mixing speed. Automated delivery systems can be set to introduce granules early in the batching process to minimize dusting. Care must be taken to not allow disintegrating bags or granules to become hung up on mixing vanes or collect in spaces where the mix has limited motion.

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SOME GENERAL GUIDELINES

Some of the most important factors in the successful placement of concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete are scheduling, timing, and weather. Although construction delays are never welcomed, a little planning ahead can go far in alleviating issues down the road. Here are some basic guidelines for dealing with these placement considerations.

Scheduling

■ When scheduling a concrete pour, try to split the loads as evenly as possible. Many discoloration problems can be avoided by having loads of the same size, as short loads (especially those under 3 cubic yards) are greatly affected by any water added.

Timing

■ If your color job will have more than one placement it is best to place integral colored concrete in as short a time span as possible. This will avoid any wide swings in ambient temperatures that can affect the water content in the mix. Warmer temperatures will typically require more water for a given slump than cooler temperatures.

Weather

■ It is recommended not to pour integral colored concrete when it is raining, or will rain within three days of pouring, as discoloration of the surface may result. If it is imperative to pour under these conditions, take precautions to keep rain or other moisture from falling on the poured surface.





TEN TIPS for SUCCESSFUL PLACEMENT (Chute or Pump)

1. Concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete should be placed as close to its final position as possible to avoid segregation due to rehandling.
2. When pumping concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete, make sure all pump priming materials are pumped **outside** of the placement area. Include at least 2 wheelbarrows of integral colored concrete. This will prevent any discoloration from occurring due to priming materials coming to the surface of the slab.
3. Concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete must be placed at a consistent slump throughout the pour, with a maximum slump of 5 inches. If any water is added after the color-conditioned concrete has begun to discharge, the color will lighten and variation will occur. Water-reducing admixtures or mid-range water reducing admixtures may be added to increase the slump. Calcium Chloride should never be used in integral colored concrete.
4. Once the ready mix truck arrives on the job, any water needed to improve the placement of the integral colored concrete should be added only once, and before the first discharge of the load. If any water is added after this, discoloration may result, as more water will lighten your color. Do not add water into the pump or onto tools or brooms. Most importantly, **Do not exceed the design water for the mix.**
5. The established mix design must not be changed at any time throughout the pour. Any changes to aggregate sizes, cementitious content, and amount of chemical admixtures or water can affect the color consistency of the resulting hardened concrete. **Whatever mix you start with, finish with.** Always do a mock-up sample to determine the look of the color to be placed. The color charts or chips are to be viewed as an approximate match to the actual concrete placed. A job site mock-up is required. A minimum of 3 yards is recommended.
6. The subgrade should be well drained and properly consolidated. Concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete should never be placed on subgrade that has freestanding water, is muddy, frozen, or has soft spots as this will affect set time and final concrete color.
7. Grade the subgrade so that the integral colored concrete is of uniform thickness and properly sloped for drainage.
8. If a portion of the concrete is placed in the shade, variations in color may occur. This is normal and will subside over time.
9. Consolidate and spade the concrete adjacent to forms.
10. Vibrate, tamp or screed the concrete, then float it to the specified finished grade, flatness and levelness.

Finishing Integral Colored Concrete

Tips and Techniques for Success

FINISHING INTEGRAL COLORED CONCRETE

The finishing of surfaces integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete should take place within a reasonable time period after placement. It is recommended that wood floats be used in this process instead of magnesium floats to avoid sealing the surface, and causing moisture to be trapped in the concrete. Always wait for bleed water “sheen” to disappear before starting floating and troweling.



- Use only slip-resistant textures, such as broom, swirl, sponge float, exposed aggregate, stamped or sandblasted for integral colored concrete flatwork.

- Water should not be sprinkled or added to the surface of the integral colored concrete while finishing. Don't add water to tools or brooms. Adding water causes the surface to pale or discolor. Sika® Film can be used to help retard surface moisture evaporation.

- Long-handled Fresnos should not be used, and hard steel troweling should be minimized to avoid trowel burns. Finish all the edges first, and do all final hand-finishing in the same direction.

- When concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete is placed in hot, dry, and windy conditions, precautions must be taken to prevent plastic shrinkage cracking. Use Sika® Film evaporation retarder.



Curing Integral Colored Concrete

Tips and Techniques for Success

CURING INTEGRAL COLORED CONCRETE

All concrete integrally colored with CHROMIX® Admixtures for Color-Conditioned® Concrete **must be cured**. For best results we recommend using one of Sika Scofield's color-matched curing materials such as LITHOCHROME® Colorwax™ or SCOFIELD® Cureseal™. The type of material will depend on the kind of work you are doing, whether it is exterior or interior concrete, and if a regular maintenance program is necessary. If integral colored concrete is not cured color **WILL NOT** be uniform. When all these steps are followed your integral colored concrete job will be one of beauty and satisfaction.

- Until it is completely cured, the color of concrete is normally less uniform and appears darker than the final color.
- Apply the curing compound by airless sprayer at a rate of 300 – 400 ft² /gal. When the concrete is hard enough to walk on gently without marring, surface moisture has evaporated, and no condensation has occurred.
- Protect the coated surfaces from damage by other trades and traffic to keep the surface water from evaporating.
- **NEVER CURE WITH WATER or any type of wet covering such as burlap, plastic sheeting, or other liquid membrane type curing compounds, as mottling, staining, and discoloration will occur.**





IMPROPER CURING

Over cure or improper curing can result from any of the following:

- Applying the cure too early while condensation is on surface
- Applying the cure too heavy will produce a cloudy to white appearance on surface
- Curing compound peels off due to over applying curing compound
- Non-uniform application of curing compound
- Applying curing compounds when outside temperatures are below 42° F and will freeze overnight will cause curing materials to whiten
- Using water curing
- Cure or sealer doesn't match. The wrong tint cup was used, or only a partial amount of the tint cup was used.
- Using a roller or Hudson sprayer

How to Remedy Poorly Cured Integral Colored Concrete

If discoloration occurs due to trapped moisture, follow the guidelines established for removing trapped moisture problems on the following pages.

To remove curing compounds that have whitened due to over application the cure must be stripped. This can be accomplished by using a citrus based stripper/cleaner, to take off the curing compound. Follow the manufacturer's recommendation for use and dilution rates.

Failure to remove all contaminants and coatings can cause the curing compound to loss adhesion, peel, and reduce its durability due to lack of bond.

Always use an airless sprayer to apply curing compounds, such as LITHOCHROME® Colorwax™ or SCOFIELD® Cureseal™.

When using curing compounds that are tinted, always use color-tinted curing compounds at full strength. Make sure the full amounts of Part A and Part B have been mixed at full strength together.

Troubleshooting

Tips and Techniques for Success

TROUBLESHOOTING INTEGRAL COLORED CONCRETE

Entrapped Moisture

Entrapped moisture in integral colored concrete can result from any of the following:

- Early and/or over finishing
- Sealing bleed water at surface (usually more prevalent with a magnesium float)
- Over-wetting subgrade allowing for standing water
- Poor drainage
- High water table
- Adding extra water to loads (retempering)
- Sprinkling the surface with water during finishing
- Uneven or no curing
- Using curing materials that entrap moisture such as polyethylene sheeting, curing blankets and plywood
- Trowel burning



How To Remedy Entrapped Moisture

The following procedure is a recommendation to reduce or eliminate discoloration from entrapped moisture. Results will vary depending on technique, materials used and jobsite conditions. This is to be used as a guide only. No matter what type of treatment used, always follow the manufacturers suggested procedures to ensure the best results.

■ REMOVING DARK DISCOLORATION

Dilute acidic solutions such as muriatic acid, acetic acid, phosphoric acid or products such as Prosoco Light or Heavy Duty concrete cleaners, which are pre-manufactured blends of acidic solutions. When blending, muriatic acid can be diluted with water at rates of one part to 20-30 parts of water depending on how severe the discoloration is, or if you are going to etch the surface of the concrete. For both acetic and phosphoric acids one part to 20 parts of water is a common dilution to use. Observe local and federal requirements for handling of acids.

■ REMOVING LIGHT DISCOLORATION

Non-acidic treatments should be tried first, typically using water and a neutral detergent. If this doesn't work then the acidic type products stated above should be tried next.



Entrapped Moisture

Step #1 - SAFETY

Many of the treatments suggested, will involve the use of materials which are acidic in nature. Always use the manufacturer's recommendation to provide the proper safety procedures when handling these materials.

Step #2 - PREPARATION - Surface and Air Temperatures

Before the application process can begin it is always recommended to let newly placed integral colored concrete dry and cure out before cleaning the surface. Depending on the time of year this may take several months to achieve. This will prevent any excessive moisture (whether internal or external) from potentially causing unsatisfactory results due to staining or blotching of concrete. Never apply treatments when outside temperatures are freezing, or will be freezing overnight.

Step #3 - PREPARATION - Equipment

When using acidic solution use a stiff-bristle non-metallic brush, a soft fiber tampico masonry washing brush, or low pressure spray (50 psi max.) equipment fitted with acid resistant hoses and gaskets. Don't exceed 50 psi as it may significantly etch the surface of the concrete, and will make rinsing the solution difficult. Do not atomize. Pressure rinsing equipment that provides at least 400psi at 4-6 gpm delivered through a 15-40 degree fan spray tip often provides the best results. Always test to determine the optimal rinsing pressures and water volumes.



Step #4 - PREPARATION - Before Final Application

Always test each type of surface for suitability, dilution rates, and desired results before the overall application. Always let the surface dry before inspection of results. If using a prepared acidic solution from a manufacturer, always use their recommended dilution rates.

Step #5 - APPLICATION

Make sure the surface is free from all contaminants such as dirt, oil and grease. This may require pressure washing, sand blasting or scrubbing with a rotary floor machine. This will depend on the surface finish and the condition of the concrete. Always pre-wet the surface with fresh water before applying acidic solution. Significant etching can occur if this method is not followed.

Apply the material to the surface with a brush or low pressure spray.

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Tips and Techniques for Success

Entrapped Moisture

Step #5- APPLICATION (continued)

Let the material remain on the surface for 3-5 minutes or until the discoloration is gone. This will vary depending on the dilution of the material used. Keep people away from cleaner once on surface.

Rinse thoroughly with fresh water to get all the material off the surface. If pressure rinsing is not available, brush the surface while rinsing with clean water.

Reapply the material as necessary to remove discoloration. Keep in mind that repeated applications might etch the integral colored concrete surfaces.

Always clean up tools and equipment with fresh water after acidic treatments.

The application of a sealer and or curing compound, such as LITHOCHROME® Colorwax™ or SCOFIELD® Cureseal™ can help maintain color vibrancy.





Wet Broom Marks

Wet broom marks in integral colored concrete can result from any of the following:

- Adding excess water to end of broom for easier finishing. The excess water causes the light streaks on the surface of the concrete only.
- Adding surface water and then brooming it in

How To Remove Wet Broom Marks

Wet broom marks can be removed using the same procedure for removing entrapped moisture, as the light areas are due to surface water finished in by the broom. Once this treatment is applied, an application of a sealer and or curing compound, such as LITHOCHROME® Colorwax™ or SCOFIELD® Cureseal™ can be applied to maintain color vibrancy.

Efflorescence

Efflorescence is a salt deposit that forms on the surface of the integral colored concrete.

Water migrates through the concrete, dissolving soluble compounds (calcium hydroxide), and then evaporates, leaving a white powdery substance (calcium carbonate) on the surface of the concrete. Efflorescence can result from the following:

- Adding excess water to the mix creating highly porous concrete
- Using pea gravel mixes that contain high amount of water
- Materials that contain high levels of salt (Water, aggregates, cement)
- Retempering with water on the job
- Having subgrade that has freestanding water

How To Remove Efflorescence

Efflorescence can be removed using the same procedure for removing trapped moisture. The use of acidic cleansers is preferred, especially if the efflorescence is severe.

In minor cases the use of a mild detergent and scrubbing with a non-metallic brush may be all that is necessary to remove efflorescence. Keep in mind that etching of the surface may happen.

Once this treatment is applied an application of a sealer and or curing compound, such as LITHOCHROME® Colorwax™ or SCOFIELD® Cureseal™ can be applied to maintain color vibrancy.

The use of a mix with a low w/c .50 or lower, the use of fly ash, and proper curing and sealing can go a long way in reducing the possibility of efflorescence.



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