



EUCLID CHEMICAL



Integrally Colored Concrete Best Practices

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DECORATIVE CONCRETE BY
EUCLID CHEMICAL

What is Integral Color ?

Raw Material

- ❑ Synthetic Iron Oxides
- ❑ Natural Oxides
- ❑ Organic Pigments



What is Integral Color ?

Synthetic Iron Oxides

- **Most Prevalent in the Industry**
- **Processing of Metallic Iron with Nitrobenzene**
- **High Tint Strength**
- **UV Stable**
- **Weather Stable**
- **Insoluble in Water**



What is Integral Color ?

Organics



- **Carbon Black, Phthalo Blues and Greens**
- **High Tint Strength**
- **NOT Weather Safe. Susceptible To Fading**
- **May Affect Air Entrainment**

What is Integral Color ?

Available in Three Basic Forms

- Powder
- Liquid
- Granular



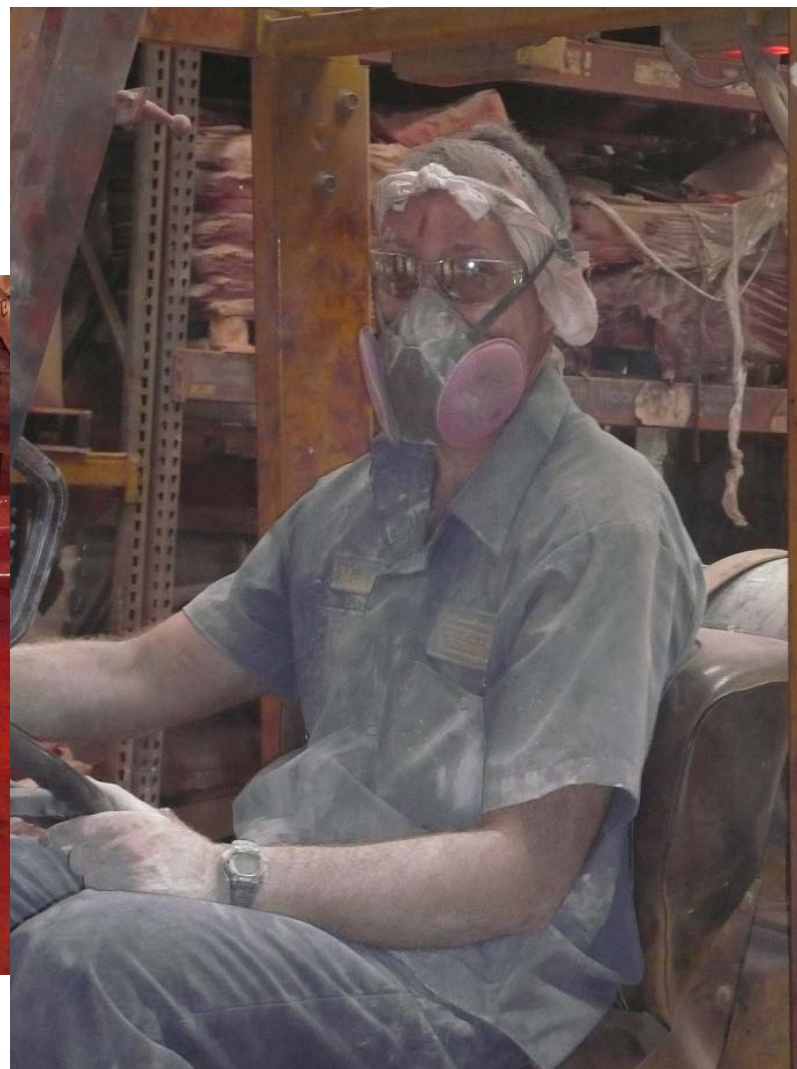
What is Integral Color

Powder



What is Integral Color

Powder



What is Integral Color

Liquid



What is Integral Color Liquid



What is Integral Color



What is Integral Color

Granular



What is Integral Color?

Granular Pigment ADVANTAGES

Lower Dosage than Liquid

No Shelf Life

No Product Settling

No Recycling Required

Spills Clean Easily- No Mess

No Freezing

You Don't Pay for Water

Free Flowing Grains

Low/No Dust

Pure Synthetic Iron Oxides- No Fillers



What is Integral Color ?

Loading

- **Portland is Measured in 94 lb “Sacks”**
- **Also Designated as “Per 100 Weight” or as a Percentage**
- **Integral Loading Refers to How Much Integral per Sack**
- **Whether Powder is Sold by the Pound or by the Yard, Cement Content is the Determining Factor**

What is Integral Color ?

Additional Information

- **Pigment Particles are 10 Times Finer Than Portland**
- **NOT Meant For Dry Shake Application**



What is Integral Color ?

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What is Integral Color ?

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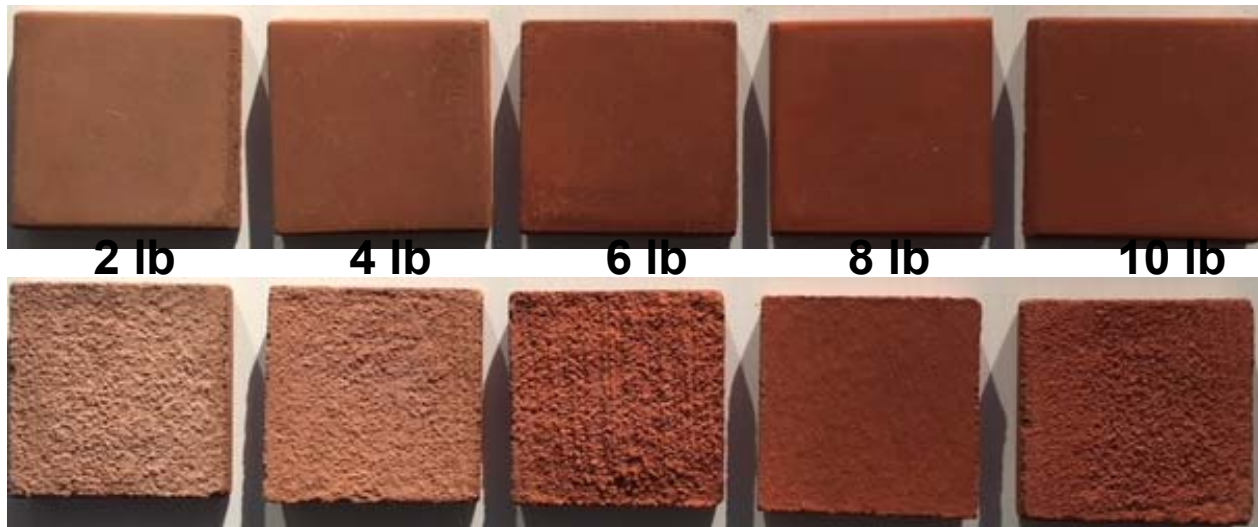
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- **Can't Gauge Final Color by Dry Pigment**



What is Integral Color ?

Additional Information

- Pigment Particles are 10 Times Finer Than Portland
- NOT Meant For Dry Shake Application
- Colors the Portland Cement Only
- Can't Gauge Final Color by Dry Pigment
- Keep It Under 10% to Avoid Weakening Concrete
- After 6% or 7% Not Much of a Visual Change in Final Color



What is Integral Color ?

ASTM C-979

Sets Standard for Integral Pigments, Including

- **UV Stability**
- **Alkali Resistance**
- **Wettability and Solubility**
- **Curing Stability**
- **Total Sulfates**
- **Affect on Setting of Concrete**
- **Affect on Compressive Strength of Concrete**
- **Color Match of Shipment**

Managing Customer Expectations

- **THE Key to a Good Job**

Meaning the customer is happy enough for you to get paid
Meaning you can use the customer for a referral

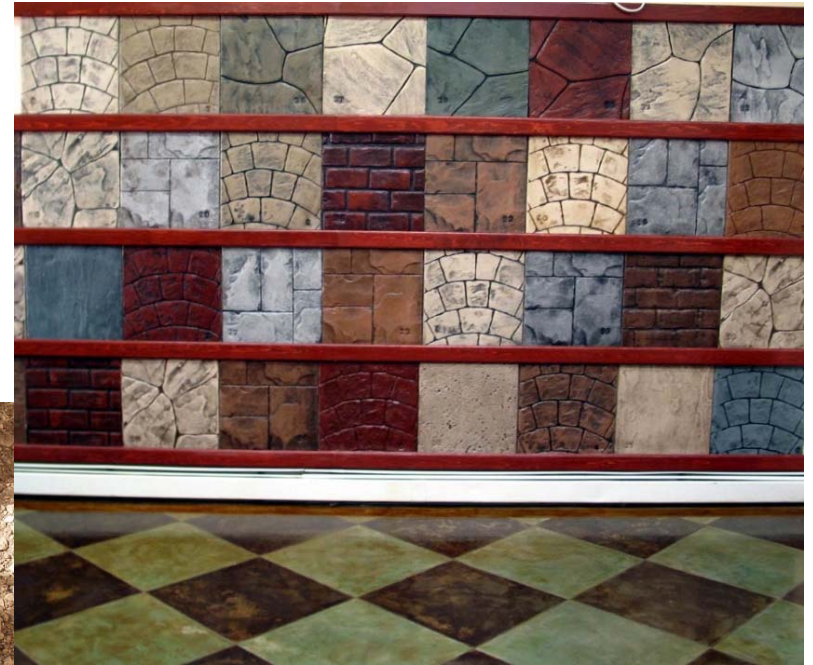
- **Educate The Consumer**

This is not a paint or a coating
You are dyeing a natural material with another natural material
List the shortcomings as well as the benefits



Managing Customer Expectations

- **Sell From Samples and Mock Ups**



Managing Customer Expectations

- NOT Color Charts



Managing Customer Expectations

Use Same Raw Materials and Finish Techniques as the Project

Troweled Finish = More Inconsistent Looking Color and Highlights Imperfections



Managing Customer Expectations

- **Photos, Photos, Photos (For Ideas NOT for Color Selection)**

These 2 photos are of the same pile of concrete



Managing Customer Expectations

- **Photos, Photos, Photos (For Ideas NOT for Color Selection)**

These 2 jobs photos were taken the same day



Managing Customer Expectations

■ References and Referrals



The Look of Genuine Brick, Slate or Cobblestone in Your Choice of Color!

CONSTRUCTION Reference Sheet

Construction, Inc. is Ph: Fax:
Trail Lookout Mountain, Georgia 30750 www: com

CREDENTIALS

- Licensed, Insured, and Bonded
- Decorative Concrete for 23 yrs
- Award Winning Company
- Complete Showroom Available
- American Concrete Certified
- Member of the Tennessee Ready Mix Concrete Association of Chattanooga
- Better Business Bureau Complaint-free
- OSHA Certified
- Office Staff & Job Estimator
- Certificate of Insurance upon request

AWARDS

- 1999 Systems Top Producer
1999 TRMCA (Tenn. Ready Mix Concrete Assoc.) Best Concrete Driveway Award
2000 TRMCA Broad St. Concrete Excellence Award for Design & Craftsmanship
2001 Systems Distributor of the Year
2004 Systems International Job of the Year Award

REFERENCES

Talley Construction	705-855-0596	Linda Sharp	423-855-4434
City of Chattanooga	423-757-5117	Rhonda Parks	423-344-1696
Hudson Co. (McDonalds)	256-857-6100	Joyce Alchley	423-821-5323
Fullmer Concrete	423-355-1551	Herley Consl.	423-254-9766
Yarkey Concrete Const	423-696-6644	Stacy Const.	423-696-0271
Cope Brothers Const.	706-226-0989	Ronnie Barnes	423-894-1914
Berry Construction	423-207-2234	Sammy Feistner	423-479-5533
E. M. J. Corporation	423-855-1500	Tom Stephens	423-488-1188
Rainers Brothers	423-255-0467	Sharon Duble	706-386-0466
Tenn Valley Authority	252-437-4851	Barah Swann	423-886-3332
Dr. Donald Hetzel	423-629-6258	T.J.J. Parks	423-848-3800
John Glidemaw	706-820-1990	Bleve Tabb	423-620-2527
Bill & Anita Mitzum	423-890-6099	David Prater	423-756-2271
Mike & Alesia Stipanov	423-396-9491	Bill Worley	423-296-4320
Hymen Kaplan	423-400-4141	Linda Sylvester	423-316-2456
Sharon Pfister	423-896-1290	Mill Run Subdivision	Contact: Robin Smith 423-400-5016
Bob Hardaway	706-276-2433	Shaub Construction	(Dairy Queen & Grill) 615-254-7180
Marilyn Keller	423-856-5444		
Greg and Zane Brown	423-825-1440		

We have also done numerous jobs for the Georgia Department of Transportation. We have completed projects at The Grand Ole Opry House in Nashville and Six Flags over Georgia in Atlanta.

Thousands of satisfied customers



How the Mix Affects The Final Color



How the Mix Affects The Final Color

PORTLAND CEMENT	560 lbs	
SAND	1120 lbs	
AGGREGATE	1680 lbs	
WATER	30-35 Gals	
ADMIXTURE (or 2)	TOTAL	3360 lbs

Integral Color will typically weigh between 6 to 36 pounds...BY FAR the smallest ingredient.

How the Mix Affects The Final Color

Doesn't it make sense that ALL those other ingredients have a dramatic bearing on the final color?

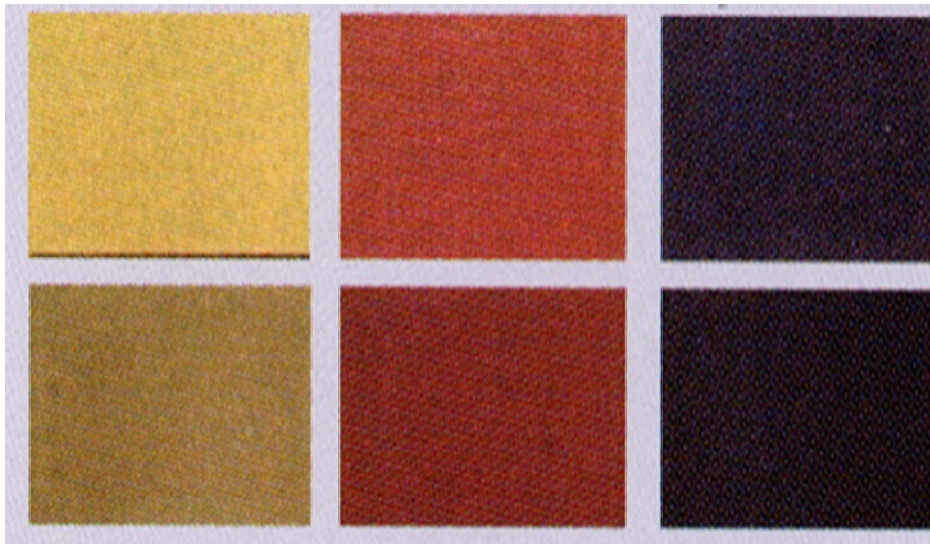
YES

How the Mix Affects The Final Color

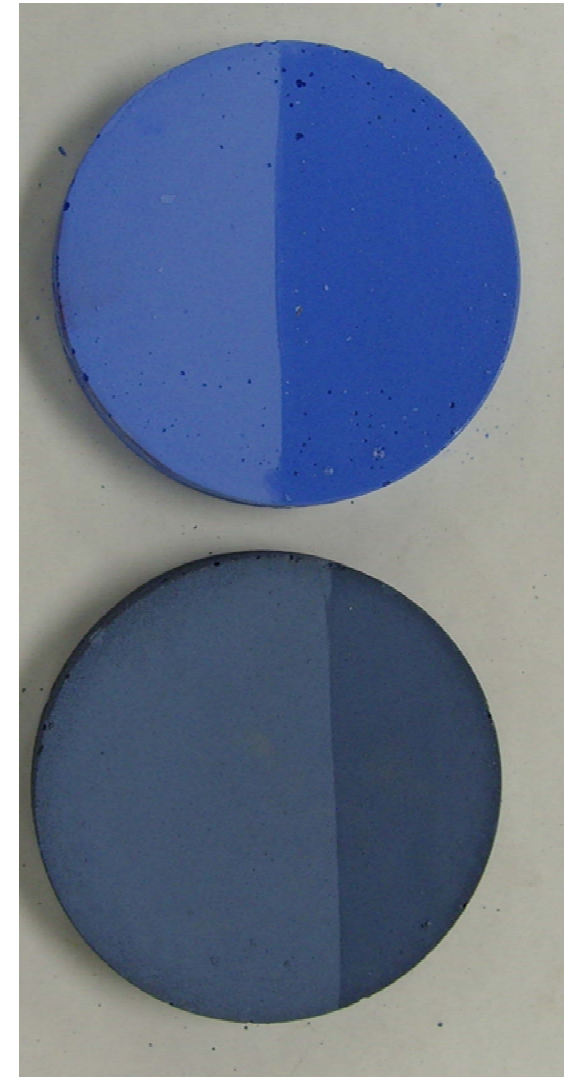
CEMENT COLOR

White vs Gray

White



Gray



How the Mix Affects The Final Color

CEMENT COLOR

White vs Gray

All With Gray Cement

Some with White Cement

The Euclid Chemical Company

Color-Crete™
Powder & Liquid Integral Color for Concrete

Color-Crete™ pigments are available in two forms: Powder and Liquid. The chart displays 25 color swatches, each with a name and a code. The colors range from earthy tones to more vibrant hues. A vertical note on the right side of the chart reads: "Note: Batch-Ready™ Integral Powder Loadings Indicated at End of Color Code".

Sandstone CC730/3*	Pecos Beige CC550/3	Fiesta CC320/3*	San Jose Buff CC715/1.5*	Austin Buff CC047/1*
Phoenix Tan CC575/1*	Sand Buff CC725/2*	Desert Tan CC275/4*	Autumn Brown CC050/5*	Cocoa CC177/6
Yuma Gold CC990/2*	Sombra CC805/3	Maplewood CC460/3*	Santillo CC705/2	Terra Cotta CC875/4*
Tile Red CC895/3	Brick Red CC100/4*	Tahoe Red CC850/5	Cherokee Red CC153/5	Redwood CC030/6*
Navajo CC510/2	Cordova CC200/4	Sedona CC750/2	Tierra CC885/2	Pueblo CC395/4
Soft Gray CC802/5	Silver Gray CC770/1*	Euro Gray CC285/3	Dark Gray CC230/4*	Charcoal CC150/5*

Specialty Colors Liquid formula for colors below require additional pigment as indicated

Sun Buff CC840/6* Requires White Pigment	Pewter CC560/4* Requires White Pigment	Euro Slate CC290/3 Requires Green Pigment	Slate CC785/3 Requires Green Pigment	Philly Blue CC570/5 Requires Blue Pigment
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* Available in Universal Color Pack

Color shown approximate laboratory sample made with type 1 portland, tan sand, Color-Crete™ pigment and 4" slump. Due to variations of job site conditions, actual colors on the chart can and will vary slightly. Conditions that will cause variation are inconsistent mix proportions, finishing and curing methods, weather conditions, and concrete raw materials. A job site or test slab sample should be made using specified materials, and the finishing and curing techniques to be used. For color consistency, batch to batch uniformity must be maintained. See Reverse Side for Best Practices and Procedures.

1611 Gunn Hwy. Odessa, FL 33556 813-886-8811 800-752-4626 www.increte.com

Increte® Systems Colors
Standard Colors for the Concrete Industry

The Increte Systems Colors chart displays 25 color swatches arranged in a grid. The colors include various shades of white, beige, tan, brown, red, purple, gray, and blue. A note at the bottom of the chart reads: "NOTE: Colors shown are represented as close as possible. Upon installation, variations can be expected due to differences in cement, aggregates and method of application."

KOOL WHITE	ADOBE BUFF	HARVEST SAND	PEACH	SAFETY YELLOW
MISTY MAUVE	CORAL	SUN BUFF	SAND BUFF	DESERT TAN
WHITE	ANTIQUE WHITE	MAPLEWOOD	AUTUMN BROWN	RUST BROWN
PLUM	BRICK RED	TERRA COTTA	TILE RED	REDWOOD
SABAL	PEWTER	SUN GRAY	GRAY	CHARCOAL
SKY BLUE	TEAL	SEAFOAM GREEN	SLATE	PHILLY BLUE

NOTE: Colors shown are represented as close as possible. Upon installation, variations can be expected due to differences in cement, aggregates and method of application.

How the Mix Affects The Final Color

CEMENT COLOR

Gray vs Gray



Lots of Different Shades of Gray Portland

How the Mix Affects The Final Color

CEMENT COLOR Gray vs Gray



How the Mix Affects The Final Color

CEMENT COLOR



Same Pigment, Two Different Cements

How the Mix Affects The Final Color

CEMENT CONTENT

Decorative Concrete Technology

Color-Crete 7 for 28

Powder Integral Color For Concrete

	Light	Medium	Dark	Heavy
Chrome Green				
Black Oxide				
Cayenne				
Red				
Vermilion				
Natural Brown				
Yellow				

Colors shown approximate laboratory samples made with type 1 portland, tan sand, Color-Crete pigment and 4" slump. Due to variations of job site conditions, actual colors on the chart can and will vary slightly. Conditions that will cause variation are inconsistent slump (water content), finishing and curing methods, weather conditions, and concrete raw materials.

4 yrd 2 yrd 1yrd

1 - 25lb. bag per 4 yards	1 - 25lb. bag per 2 yards	1 - 25lb. bag per 1 yard	1 - 25lb. bag per 4 yards	1 - 25lb. bag per 2 yards	1 - 25lb. bag per 1 yard

How the Mix Affects The Final Color

ADMIXTURES



How the Mix Affects The Final Color

ADMIXTURES

- Air Entraining** **Normally Lighter**
- Plasticizer** **Initially Darker (reduced affects Later)**
- Accelerator (NO Calcium Chloride)** **Darker**
- Water Repellant** **Possibly Darker**

How the Mix Affects The Final Color

ADMIXTURES

No Calcium Chloride Based Accelerators

Most Commonly Available

Least Expensive

Decreases Set Time

Increases High Early Strength

BUT, Will Leave a Blotchy, Hazy Surface

Use Non Calcium Chloride

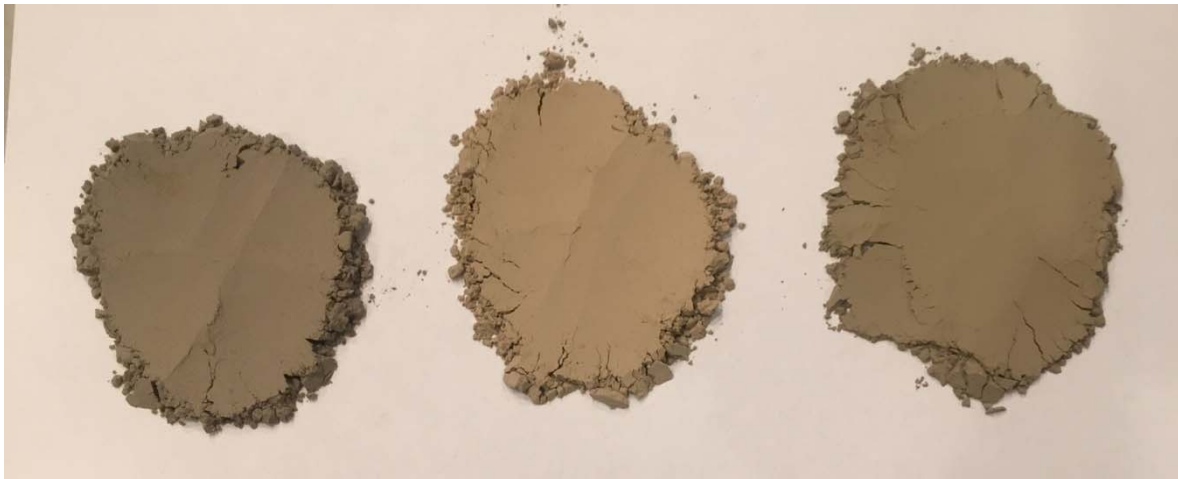
Accelerators



How the Mix Affects The Final Color

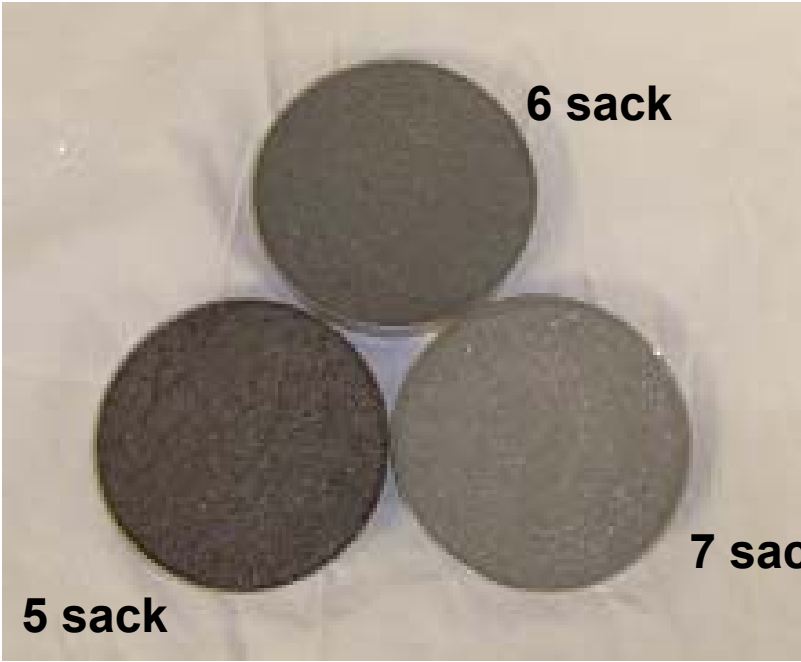
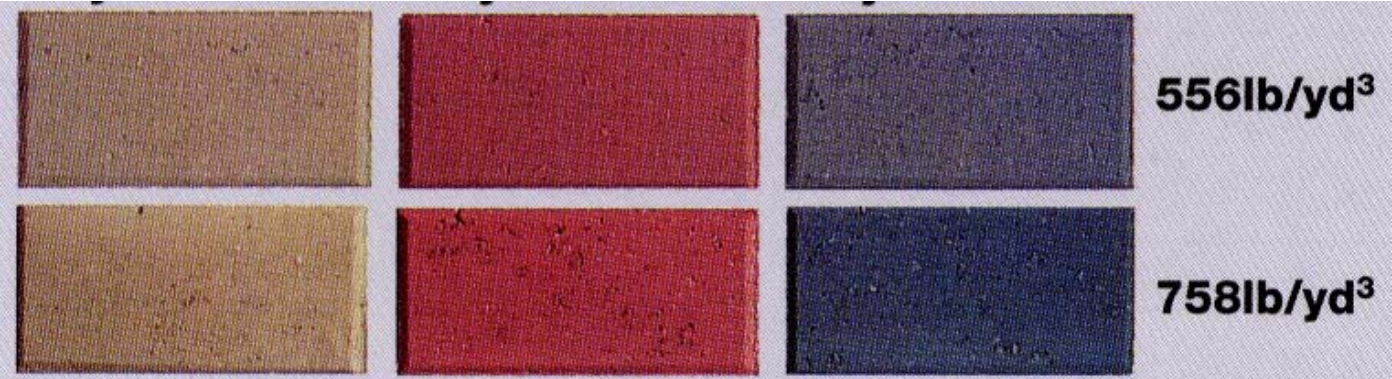
ADMIXTURES

**Pozzolans- Portland Substitutes
ie. Fly Ash and Slag**



How the Mix Affects The Final Color

CEMENT CONTENT



How the Mix Affects The Final Color

AGGREGATES



- Largest Part of The Concrete Mix
- Initial Influence but Greater Influence as the Slab Weathers

How the Mix Affects The Final Color

WATER TO CEMENT RATIO

- **Most Chart Colors/Samples Produced at 4" Slump**
- **Choose Lowest Possible Slump (4"-5")**
- **If Higher Slump Needed For Placement, Use Plasticizer**
- **Consider Moisture in Raw Materials**
- **More Water = Lighter Color**
 - Color Concentration
 - Bleed Water Rises and Leaves Larger Pores/Capillaries
 - Resulting in Lighter Looking Surface
- **Don't Add Water at the Job Site. If You Do- Be Consistent**

How the Mix Affects The Final Color

WATER TO CEMENT RATIO



How the Mix Affects The Final Color

WATER TO CEMENT RATIO



Two Pours, Same Day. Water Added to Second Pour

How the Mix Affects The Final Color

Question??

**At What Loading Will the Mix
Components Have More Influence?**

High or Low?



How the Mix Affects The Final Color

Best Practices

- **Mock Ups Should Be at Least 3 Yards**
- **Use Same Raws as Will be Used in Final Project**
- **Use Minimum Cement Content of 470 lbs/Yard**
- **Use 100% Portland. If Pozzolans Used, Be Consistent**
- **Do Not Exceed 5" Slump**
- **At The Plant, Add Pigment to the Head Water**
- **At the Job Site, Add Color Into Mix (Avoid Fins). Mix 8 to 12 Mins, Check For Ribboning**

How the Mix Affects The Final Color

Best Practices

- **If Sand Blasting or Exposing Agg, Cut Pigment Bag Open and Pour Color Into Truck**
- **Also Short Mix Time or Small Aggregate May Not Completely Disintegrate Bags**
- **If Using Liquid Color at Job Site, Use Same Amount of Rinse Water in Each Bucket**
- **Use No Calcium Chloride in Mix**
- **Keep Mix Time Consistent**

How the Mix Affects The Final Color

Conclusions

With a Little Care and Attention to Detail, You Will End Up with a Close Match



How the Mix Affects The Final Color

Conclusions

However, If You Just Roll The Dice, You Will Probably End Up With...



How Prep Affects The Final Color

Job Site Prep

Grade Land So Water Will Drain Away From Slab



How Prep Affects The Final Color

Job Site Prep

Place Concrete Over Uniformly Graded Compacted Subgrade/Sub Base (Sand, Gravel, Crushed Stone)



How Prep Affects The Final Color

Job Site Prep

Dampen Sub Base



How Prep Affects The Final Color

Job Site Prep

Don't Pour Over Mud, Standing Water, Frost, or Ice



How Prep Affects The Final Color

Job Site Prep

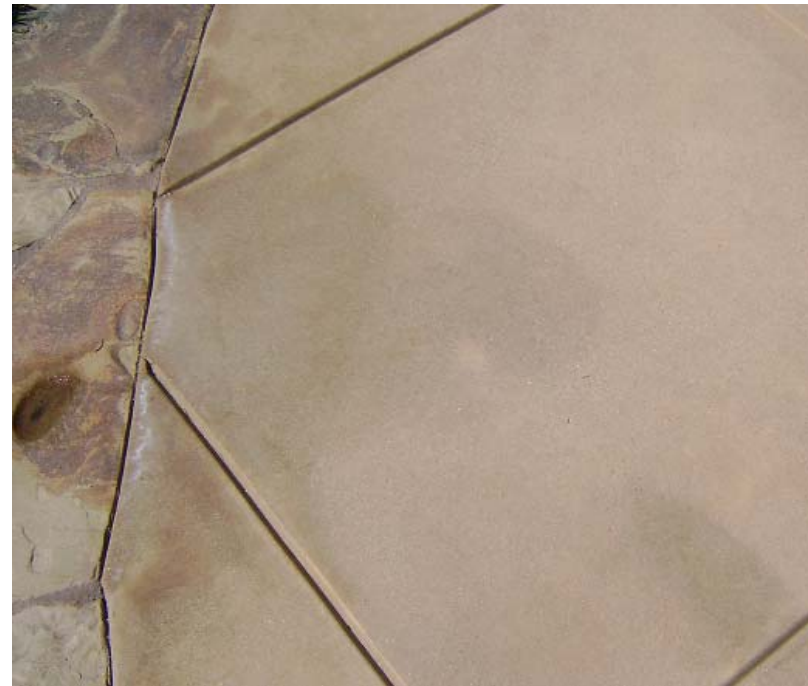
Set Forms to Achieve Uniform Slab Thickness



How Prep Affects The Final Color

Job Site Prep

Turn Off Sprinklers



How Prep Affects The Final Color

Job Site Prep

Improper Prep Can Lead To Disaster



Weather

- **Temperature Affects Cure Time**
- **Temperature Affects Water Required to Maintain Consistent Slump**
- **Temperature Affects Size and Shape of Calcium Silicate Crystals During Hydration**
 - Higher Temp = More Irregular and Larger Crystals
 - = More Porous Concrete
 - = Greater Light Scattering Across Surface
 - = Lighter Looking Color

How Weather Affects The Final Color

Weather

Brookings, SD



16 Month Project

Weather

- **Try To Place During Consistent Weather**
- **60 to 80 Degrees is Perfect**
- **Schedule to Avoid Exposure to Hot Sun Until Curing Materials Are Applied**
- **Avoid Windy Conditions**
- **No Rain, Snow, or Sub Freezing Temps**



**INTEGRALLY COLORED CONCRETE
BEST PRACTICES**

RECAP

Be Consistent

Be Detailed



QUESTIONS AND COMMENTS ??



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