



CALCIUM CARBONATE

Let HuberCrete[®] Calcium Carbonate Help You Produce the Brightest White Concrete Building Products Possible

Whether it's ready-mix concrete, precast products or self-consolidating concrete (SCC), HuberCrete[®] calcium carbonate allows you to cost-effectively formulate a white concrete product that will enhance your overall color and brightness without impacting the properties of fresh or hardened concrete.



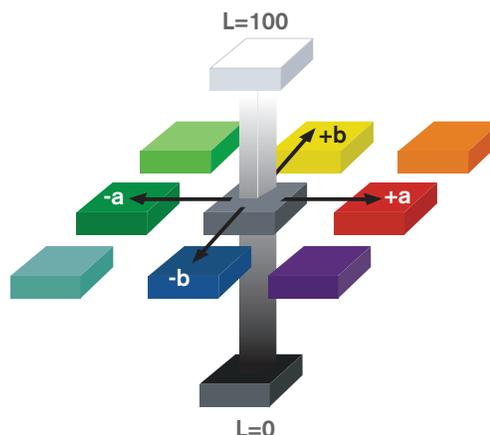
Staircase
manufactured
with HuberCrete[®]
calcium carbonate.



The High Brightness of HuberCrete® Calcium Carbonate Enhances the Color of Your White Concrete

Concrete color is determined by the fine aggregate and paste portion of the concrete mix. Producers commonly choose the lightest color sand and white cement. But white cement is expensive and has a yellow cast. **Replacing a portion of the white cement in the concrete mix will not only reduce the overall cost of the concrete, but will also improve the whiteness of the finished product.** Color measurements of concrete made with 100% white cement, HuberCrete® calcium carbonate, and slag cement show the use of HuberCrete gives a higher brightness along with a lower yellowness.

Hunter Color Reflectance	L*	a*	b*
White Cement	88.25	-0.02	4.74
HuberCrete® Preferred 20%	89.32	0.05	4.18
HuberCrete® Preferred 40%	90.29	0.17	3.67
HuberCrete® Extra Fine 20%	89.20	-0.06	4.31
White Cement + TiO ₂	90.86	-0.01	4.52
Slag Cement	79.37	0.28	4.61



White Cement =
\$108/yd³*



20% HuberCrete® Preferred
Calcium Carbonate = \$98/yd³*



Cement + TiO₂ =
\$110/yd³*



20% HuberCrete Preferred =
\$98/yd³*



Cement + Slag
Brightness (L) = 79



Cement + HuberCrete Preferred
Brightness (L) = 89

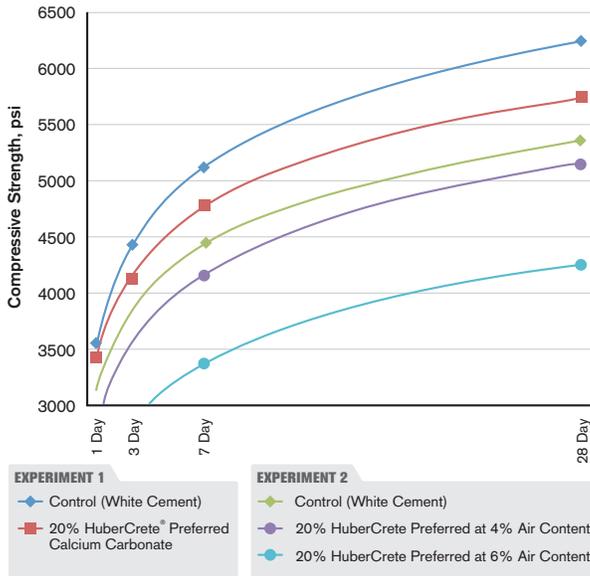


White Cement =
\$108/yd³*



40% HuberCrete
Preferred = \$80/yd³*

*Using Industry Standard Costs.



Self-Consolidating Concrete (SCC) Mixes with HuberCrete® Preferred Calcium Carbonate

Particle packing and distribution play a key role in creating a cohesive SCC mix that avoids segregation. With a range of available HuberCrete® calcium carbonate products, the powder fraction can be optimized to fill the voids and bridge the gap between the cement and fine aggregates to make a better SCC. The particle packing effect allows reduction of the amount of free water, needing only a high range water reducer (HRWR) to achieve the desired flow.

Partially replacing the cement with HuberCrete also helps to maintain desired fresh properties while better controlling the heat of hydration in projects where excess heat can inhibit proper cementitious reaction.

It is critical that the materials used in SCC remain consistent for the duration of the project and from project to project. Since HuberCrete is manufactured under precise production controls, you can be assured that the calcium carbonate you use will perform consistently.

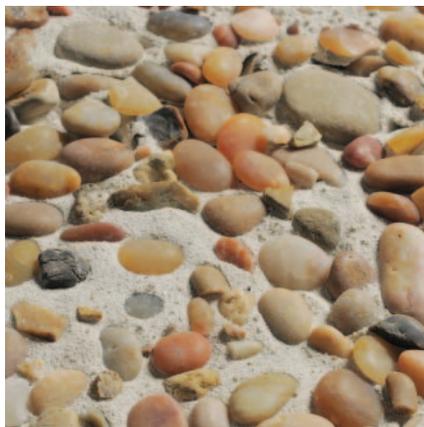
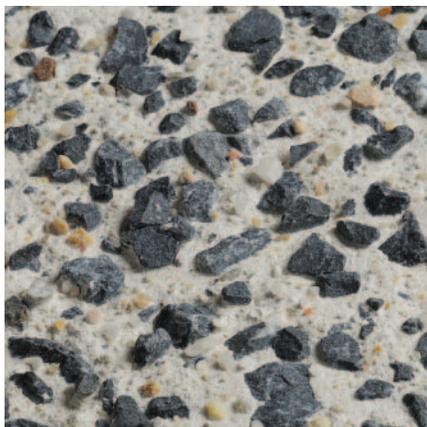
SCC Mixes Using HuberCrete Preferred Replacing White Portland Cement and Precast Curing Profile

The American Concrete Institute (ACI) recognizes that the use of ground limestone or mineral filler to achieve minimum powder content in highly fluid mixtures is one way to ensure SCC stability while minimizing the cost increase due to higher powder requirements.

Ingredient	Experiment 1		Experiment 2		
	Control (White Cement)	20% HuberCrete® Preferred Calcium Carbonate	Control (White Cement)	20% HuberCrete Preferred at 4% Air Content	20% HuberCrete Preferred at 6% Air Content
Federal White Cement (lb/yd³)	925	740	925	740	740
HuberCrete Preferred (lb/yd³)	0	185	0	185	185
Texas Crushed Stone (lb/yd³)	1208	1257	1250	1250	1250
White Washed Sand (lb/yd³)	1208	1257	1250	1250	1250
Water (lbs/yd³)	360	295	315	315	315
Water/Cement Ratio	0.39	0.4	0.34	0.34	0.34
Total Material (lb/yd³)	3701	3834	3740	3740	3740
HRWR - Euclid Chemical Plastol 5000 (oz/cwt)	4	5.405	4	4	4
AEA - Euclid Chemical Air Mix (oz/cwt)	0.8	0.541	2	1	2
Yield (ft³)	27.05	27.05	25.77	25.77	25.77
Slump Flow (Target 24 – 27 in.)	27	24.5	24	25	24
Visual Stability Index	2	1	1	1	1
Unit Weight (lb/yd³)	133.4	136.3	130	134	128.4
Air Content (Target 5 ± 2%)	6.5	6.7	6.0	3.7	6.3
Time of Setting					
Initial Time of Setting (hr:min)	3:23	2:53			
Final Time of Setting (hr:min)	4:17	3:52			
Compressive Strength 1 Day, psi	3550	3430			
Compressive Strength 3 Day, psi	4430	4060			
Compressive Strength 7 Day, psi	5010	4790	4420	4160	3370
Compressive Strength 28 Day, psi	6300	5750	5350	5150	4250

HuberCrete® Calcium Carbonate Helps Provide an Eye-Catching Appearance

If the architectural design requires an exposed stone appearance, what better way to have the stone stand out than a white background? HuberCrete® calcium carbonate combined with white cement and light colored sand allows the face of the concrete surface to give an eye-catching appearance regardless if the stone color is round river rock, dark angular stone, or exotic quartz. Replacing a portion of white cement with HuberCrete is a very cost effective way of improving the whiteness of the concrete.



No Matter What Exposed Aggregate You Want, HuberCrete® Calcium Carbonate Will Give You The Brightest Background

American Concrete Institute (ACI) and American Society of Testing and Materials (ASTM) Research

Research referenced in both ACI and ASTM documentation shows replacing a portion of cement with ground limestone can aid in comparable or higher green strength and set time through:

- Increasing powder particle packing density and providing nucleation sites for hydration.
- Benefits associated with increased cement content without change to chemical reaction heat generation.
- Chemical interaction of calcium carbonate with compounds present in cementitious materials.

Huber's internal research supports the assertions above made by ACI and ASTM.

Huber's Involvement with ACI and ASTM

Huber Carbonates, LLC is actively involved in the ACI and ASTM process for publishing standards, specifications and guidance for using calcium carbonate in concrete through attending conventions and committee meetings on a regular basis and presenting our work at appropriate symposiums. Huber's technical staff is available to ensure you utilize the right tests and limits and that reporting is available to ensure your specifications are met.

ACI and ASTM recognize calcium carbonate can:

- Improve workability / flowability / pumpability due to increased powder content.
- Improve mix stability.
- Increase sealed curing.
- Lower porosity leading to reduced chloride ion diffusion.
- Less shrinkage at early and later ages.
- Less delayed time of cracking.
- Lack of thaumasite sulfate attack in cold, sulfate rich environments.
- Adequate durability related to freeze-thaw and scaling resistance.

The HuberCrete® Calcium Carbonate Sustainability Advantage

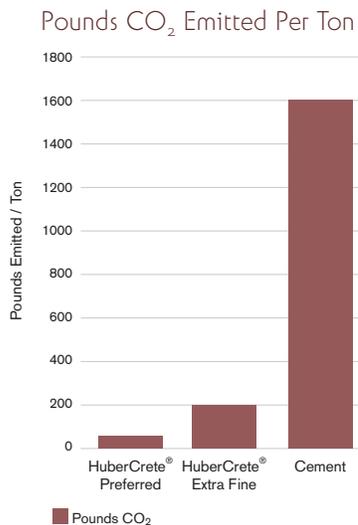
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HuberCrete Supports LEED® Certification

In addition to the aesthetic benefits of using HuberCrete® calcium carbonate in your white concrete building products, you also get the environmental-related benefit of the product supporting LEED® certification. With three convenient U.S. locations (Marble Hill, Georgia; Marble Falls, Texas; and Quincy, Illinois) to supply HuberCrete products for your project, LEED points can be earned through locally sourced material, reduced CO₂ emissions by reducing cement usage, and improved solar reflectance.

2 ✓

HuberCrete Usage Lessens the Environmental Impact of CO₂ Emissions



Today, many regulating bodies are seeking sustainable development. One means to help achieve this goal is through reducing the amount of cement being used in concrete construction and supplementing the paste portion of the concrete with materials that do not impact the performance of the concrete. A very cost-effective replacement is HuberCrete.

For every ton of cement produced, approximately 1,660 pounds of CO₂ are released into the environment.* Depending on the grade of HuberCrete used, as little as 54 pounds of CO₂ are released for each ton substituted.

*Cement data can be attained at: <http://www.iea.org/Textbase/npsun/tracking2007SUM.pdf>

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HuberCrete is Low in RCRA Metals

Another benefit is knowing all of our HuberCrete products are routinely tested for total heavy metal content and that any heavy metals detected are significantly less than the Resource Conservation and Recovery Act (RCRA) limits for hazardous materials. Plus, at the recommended replacement levels, HuberCrete is a negligible contributor to the overall heavy metal content of the concrete.

Total Metal Concentration for RCRA 8

(TCLP Threshold Required for Toxicity)

RCRA 8 Metals (TCLP Limits)	HuberCrete®		Detection Limits, ppm
	Extra Fine	Prime	
Arsenic, total (5.0)	0.7	0.9	0.50
Barium, total (100.0)	6.2	16.9	0.50
Cadmium, total (1.0)	0.2	0.1	0.20
Chromium, total (5.0)	1.9	1.6	1.0
Lead, total (5.0)	1.6	1.3	0.50
Selenium, total (1.0)	ND	ND	0.50
Silver, total (5.0)	ND	ND	0.50
Mercury, total (0.2)	ND	ND	0.01

If you are required to report Toxics Release Inventory (TRI), you can see that mercury is not detected above 10 parts per billion and lead is approximately 1 part per million.



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Results above determined over six-year average of testing; ND = Non-Detected



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Saving \$\$\$\$ by Using HuberCrete® Calcium Carbonate

Let us show you how you will be able to save \$\$\$\$ while producing the brightest white concrete building product! Go to

www.hubermaterials.com/costsavings

and input you specific materials costs to calculate the savings you will see when using HuberCrete® calcium carbonate.

See our cost-savings example below.* We are looking forward to working with you.



See for Yourself the Cost Savings Benefit of HuberCrete® Calcium Carbonate

			Base Mix		Material %	
Concrete Materials	Cost per*	Unit	lb/yd ³	Cost/yd ³	GCC	GCC
Coarse Aggregate - Customer Specified	\$45.00	Ton	1250.0	\$28.13		
Mid Aggregate	\$15.00	Ton	0.0	\$0.00		
Fine Aggregate / Sand	\$20.00	Ton	1250.0	\$12.50		
White Portland Cement (ASTM C-150)	\$200.00	Ton	925.0	\$92.50	80	70
Ground Calcium Carbonate	\$75.00	Ton	0.0	\$0.00	20	30
Water	0.40	8340 lbs	370.0	\$0.44	100	100
TOTAL BATCH WEIGHT (lb/yd³)			3795.0			
		Material Cost per yd ³	\$133.57	\$122.01	\$116.22	
Batch Size, yd ³	10	Material Cost per Batch	\$1,335.69	\$1,220.06	\$1,162.25	
Batches per Day	20	Material Cost per Day	\$26,713.73	\$24,401.23	\$23,244.98	
		Difference per Day		-\$2,312.50	-\$3,468.75	

*Your Actual Delivered Costs Will Vary.

For more information about HuberCrete® calcium carbonate or to order a sample:

Web: www.hubermaterials.com/concrete

Email: hubermaterials@huber.com

Phone: 866-JMHUBER (866-564-8237)

