



OVER 50 YEARS OF PERFORMANCE DESIGNED SOLUTIONS

URC CS Products

Proprietary, Cement Free Colloidal Silica Bonded Compositions

Background: Wear mechanisms ranging from severe alkali attack, slag erosion, abrasion and excessive temperatures may compromise a traditional low cement bonded product due to undesirable calcium phases. Cement free systems can often provide performance enhancing and/or cost effective solutions, in addition to offering less down time relative to heat up.

New Development: Until now, the advantages of the available cement free options . . . *primarily colloidal silica* . . . were sometimes outweighed by the following:

- Poor green strengths
- Less than ideal flowability
- Higher cost installs
- Awkward logistics with CS binder

Now, the URC CS (*colloidal silica*) products address these potential issues while offering an exciting list of benefits!

URC PRODUCT	Al ₂ O ₃ %
UNI-PUMP 50 CS	50
UNI-PUMP 60 CS	60
UNI-PUMP 60Z CS	60 + Zircon
UNI-PUMP 65 CS-ALKR	65 <i>Outstanding Alkali Resistance</i>
UNI-PUMP 70 CS	70
UNI-PUMP 76-17SC CS	76 + SiC + C
UNI-PUMP 80 CS	80
UNI-PUMP 85 CS	85
MC-85 CS	85 <i>Precast Deltas</i>
UNI-PUMP 90 CS	90
UNI-PUMP 95 CS	95
UNI-PUMP 400 CS	75 + SiC + C

FEATURES	BENEFITS
BEST IN CLASS PROPERTIES	
<ul style="list-style-type: none"> • Proprietary URC CS Binder 412 • Enhanced Rheology and Grain Sizing 	<ul style="list-style-type: none"> • Lower Binder Usage <ul style="list-style-type: none"> - Less liquid = closer particle packing = improved properties • Best in Class Green Strength <ul style="list-style-type: none"> - >2000 psi CCS after air dry at ambient temp. - Enables mold removal and handling • Excellent Physical Properties <ul style="list-style-type: none"> - Outstanding pump and shotcrete characteristics - HOT MOR > most cement products - Prism spall (<i>shock</i>) test over 30 cycles - Resistance to alkalis/slag - C704 abrasion as low as 1.7 to 3.0 cc
CONFIDENT INSTALLS	
<ul style="list-style-type: none"> • Customized QA Testing Relative to Installation 	<ul style="list-style-type: none"> • All UNI-PUMP CS products can be cast, pump or shot* by adjusting the level of CS Binder 412. *Shotcrete with CS Activator • The URC QA test will use the appropriate % of binder anticipated for the install and furnish customized data for the project
<ul style="list-style-type: none"> • Customized CS Binder 412 Logistics 	<ul style="list-style-type: none"> • Relative to the needs of the installer, we can: <ul style="list-style-type: none"> - Furnish a tote for large projects - Furnish premeasured container for small jobs, precast shapes, etc.
<ul style="list-style-type: none"> • Faster Water/Vapor Loss During Dry-out 	<ul style="list-style-type: none"> • Less down time . . . Start dry-out immediately w/potentially faster heat up schedules










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CS CASE STUDIES

URC PROPRIETARY Colloidal Silica BONDED PRODUCTS

Method of Install	Application	URC Product	Key Feature
 <p>Precast <i>(URC)</i></p>	EAF Delta	MC 85 CS	<p><u>Performance</u></p> <ul style="list-style-type: none"> • Current deltas running 170-200 heats • Two MC 85 CS deltas ran 264 and 275 heats
 <p>Shotcrete</p>	Rotary Dross Furnace/Aluminum	UNI-SHOT 60 CSA HT	<p><u>Shotcrete Results</u></p> <ul style="list-style-type: none"> • Customer expected a 4 week campaign in the nose ring/cone • UNI-SHOT 60 CSA HT lasted 14 weeks after being shotcreted
 <p>Cast In Place</p>	Door Jamb Protector	UNI-PUMP 85 CSA HT <i>(3% SS)</i>	<p><u>Cast Results</u></p> <ul style="list-style-type: none"> • Originally cast to protect jamb • As of writing date, still in service
 <p>Precast <i>(Contractor)</i></p>	EAF Delta	MC 85 CS	<p><u>Air Set</u></p> <ul style="list-style-type: none"> • Delta lifted and moved into furnace 14 hours after cast
 <p>Pumped</p>	Batch Reheat Furnace	UNI-PUMP 60 CS	<p><u>Veneering</u></p> <ul style="list-style-type: none"> • Customer wanted to level hearth, pouring over existing refractory • After 2 months, looks excellent



RECOMMENDATIONS FOR TYPICAL INSTALLATIONS

- What is the Goal of Mixing?** To disperse the URC CS Binder 412 (*source of colloidal silica*), activate the proprietary wetting agents and develop proper rheology characteristics of the product.
- What type of mixer is needed?** A clean, dry mixer with high shearing action and high starting torque is mandatory. *A rotary or tumbling mixer is not satisfactory.*
- How much URC CS Binder 412 is needed?** ... In URC CS products, the source of colloidal silica is found in our proprietary URC CS Binder 412. Since CS pumpable products can be cast, pumped or shot, the recommended level of Binder 412 is available from:
- The Technical Data Sheets, showing a recommended level for each installation method.
 - The COA data tested specifically for the project and the respective install method.
- How is the URC CS Binder 412 shipped?** • The URC CS Binder 412 is shipped with the product.
- To maximize mixing efficiency, we will customize the packaging of the Binder 412, *i.e., larger totes for high volume projects or smaller containers for small jobs.*
 - The URC CS Binder 412 and the material must always be above 40° F to avoid freezing.
 - *Contact your URC rep for details.*
- What is the mixing process?** • Dry mix for 15-30 seconds.
- Add the URC CS Binder 412 and allow to mix for 5 minutes.
 - 60-70° F binder temperature is recommended, and >40° F is mandatory.
 - After 5 minutes of wet mixing and the CS product still looks dry, add 0.1 to 0.2% more binder and mix 1-2 minutes. *Repeat as needed.*
 - Arrive at the stiffest consistency suitable for the application, *i.e., minimize binder usage.*
 - Total mixing time should not exceed 10 minutes.
 - *Do not let the mixed product sit in the mixer for longer than 10 minutes.*
- How can the CS Mixes be shotcreted?** • Use the same piston pump, accelerator pump and dedicated compressor used with low cement shotcrete products.
- Add the appropriate amount of Binder 412 to bring the mix to shotcrete consistency.
 - Specifically use URC CS Activator. This will be shipped with the material and Binder 412.
- What type of vibration is recommended for casting and pumping?** • External vibration using form vibrators is preferred, ideally placed both on the outside and inside (*if possible*) of forms:
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| <p><i>Recommended vibrators:</i></p> <ul style="list-style-type: none"> - 10,000 – 12,000 vpm. - Force of 4,000-5,000 pounds (18,000-22,000 newtons.) - Placed on 6 ft. centers. | <p><i>Recommended vibrator usage:</i></p> <ul style="list-style-type: none"> - Initial vibration should facilitate flow and fill cavities. - Avoid constant vibration, as segregation can occur. - Turn vibrators off when material is level. - If a probe vibrator is used to aid movement, withdraw <i>slowly</i> as the vibrator remains running. |
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- What are the air curing details?** • During the first 24 hours after pouring, the product and ambient temperatures should range from 70-95° F, with a minimum of 60° F.
- *Do not cover with plastic or curing compound!*
 - Set times with URC CS products vary with the amount of the URC CS Binder 412.

Casting: <14 hours	Pumping: 18-24 hours	Shotcreting: 24+ hours
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- When can forms be removed?** • Relative to temperature conditions, thickness and form details, URC CS products may require a minimum of 24 hours to handle or demold.
- *Field Test:* Place a small, mixed sample in an air tight plastic bag. When the sample is solid, this is a good indicator that the forms/molds can be stripped.
- What are the dry-out/heat-up details?**
- Care must be taken to allow the removal of water and develop strength.
 - URC CS products are by nature more permeable than low/ultra-low cement bonded products. Therefore, dry-out schedules can be more aggressive relative to cement bonded systems.
 - Because all linings and furnaces differ in regard to thickness, backup and heat source, *please contact your URC rep for a specific heat-up schedule.*