TECHNICAL DATA SHEET

GreenCanvas™

Expansive Component for Sustainable Concrete

INTEGRAL / EXPANSIVE COMPONENT / NO JOINTS, NO CURLS

PRODUCTIONS TEAM, INC.

Giving you the direction you need.

PRODUCT DESCRIPTION

GreenCanvas Expansive Component for Sustainable Concrete - producing what many thought impossible, reducing or eliminating concrete curl, simplifying joint layout through reduction/elimination of control joints, and eliminating dry shrinkage cracking. This naturally found, cementitious, inorganic powder will produce a shrinkage compensating concrete when added to standard concrete mix designs. Profiled architectural concrete floors placed with GreenCanvas promote even aggregate reveal desired by owners and design professionals and eliminate joint maintenance. GreenCanvas will increase the life cycle, abrasion resistance, durability, tensile strength, and water tightness of the finished concrete placement. The densification of the concrete results in an increase in the resistance to chloride intrusion and a concrete life cycle that is up to 2 1/2 times conventional concrete. Its mechanical bond with reinforcement, the lack of cracks, and the dense microstructure can eliminate the need for re-bar coating in the harshest of environments.

BASIC USE

GreenCanvas is an expansive, specialty component classified as ACI 223 TYPE G based on the chemical mechanism used to obtain expansion in the concrete matrix during the curing process. Its use substantially reduces or eliminates joints for contraction. Structural design, concrete mix design, and placement guidance is governed by ACI document ACI 223, "Guide for the Use of Shrinkage Compensating Concrete."

@EarlyAge Concrete: GreenCanvas is an expansive component, not an add-mixture, batched at the plant or on-site at the time of placement. Varying the percentage from 4-12% will impact the performance and alter joint spacing, dry-shrinkage, and curl. The mechanical bond with reinforcement will eliminate the need for the use of an epoxy-coated re-bar.

@MatureAge Concrete: Not Possible, Integral component only.

Benefit @Profile & Polishing: GreenCanvas is used as the foundation of an optimized Concrete Canvas in any environment where life cycle and performance matter. Designed to produce a concrete substrate that is free of curl and has dramatically reduced control joints, resulting in an evenly revealed surface for any profiled, honed, polished (PHP) processed floor.

For use in conventional concrete: Eliminate many of the contraction joints, filler, and maintenance associated with traditional concrete placement requirements.

Standard Concrete

- No Shrinkage Cracking
- Large, Monolithic Pours
- Labor, Material and Maintenance Savings From Traditional Slabs with Joints/Joint Filler

For use in infrastructure projects such as bridges, highways, dams, parking structures, watertight construction, tank farms, grouting, and oil/gas cementing, including down-hole.

Bridge Deck

- Eliminates Joints and Minimizes Dry Shrinkage
- Reduced Moisture/Chloride Intrusion into the Concrete
- Reduced Exposure of Rebar to Corrosion and Elements Eliminating the need for expensive coated re-bar
- Chloride Exposure is Reduced
- Reduced Washboard Effect on Highways Due to Curling

For use in Profiled Hone Polished (PHP) Floors: GreenCanvas should be the standard for architectural concrete floors, especially on elevated slabs, where owners and design professionals desire even aggregate reveal.

Architectural Abrasive Polished Concrete

- Elimination or Reduction of Shrinkage Cracking
- Promotes Uniform Aggregate Reveal
- Few, if any Joints, Enhancing Appearance & Improving Cost Savings
- No Issues With Slab Curl at Joints or Around Edges

For Eliminating Joints: Larger, monolithic designs can often eliminate expansion joints between adjacent placements. Expansion joints for thermal expansion of linear elements are determined by thermal considerations that SCC does not change. Additional detail below: Joints.

ARCHITECTURAL APPLICATIONS

Toppings Slabs

Interior/Exterior

Piers Oil/Gas

Arenas/Artificial Skating Rinks

Watertight Construction Walls/Tilt up

Slab on Grade/Slab on Deck

Concrete Storage Tanks

Shotcrete Bridge Decks

Grout

Parking Structures

Integrally Troweled Placed Concrete

Architectural Concrete Floors

Architectural Abrasive Polished Concrete

FEATURES

- Reduces Or Eliminates Dry Shrinkage Cracking
- Reduction In Joints (Allowing Large Monolithic Pours)
- Eliminates Slab Edge Curling
- There Is No Change In Color Or Texture Of The Finished Concrete.
- Cementitious
- Expansion Occurs Independently Of The Hydration Reaction
- Transparent In The Mix
- A Calcium Hydroxide Platelet Crystal System
- Not An Ettringite Expansive Component
- Sustainable; Based On The Life Cycle, Composition, Labor Savings, And Maintenance
- GreenCanvas Is A Green Product; It Does Not Contain Organic Chemicals, Unlike Shrinkage Reducing Admixtures
- Cost Savings Of GreenCanvas Offsets Costs Incurred Cutting And Installing Joints
- Reduction In Joints Eliminates Costly Installation Repairs On Joints
- Cuts Labor, Cuts Downtime
- Reduces Maintenance
- Extends Forklift And Factory Vehicle Life
- Extremely Impermeable
- Corrosion Resistant

BENEFITS

- Reduces Or Eliminates Dry Shrinkage Cracks
- Reduction In Joints Allowing Large Monolithic Pours
- Eliminates Slab Curling At Edges And Any Joints
- Transparent In The Mix-Does Not Affect Set Time, Air Content Or Mechanical Strengths
- Cementitious
- Expansion Occurs Independently
- Does Not Require Special Handling, Placing, Finishing Or Curing Techniques And Procedures
- Sustainable Composition - GreenCanvas Is A Green Product; It Does Not Contain Chemicals, Unlike Shrinkage Reducing Admixtures
- Increased Concrete Life Cycle
- Life Cycle Labor And Maintenance Savings
- Initial Placement Savings - Eliminating Joint: Layout, Cut And Fill
- No Moisture Issues For Reinforcement Due To Mechanical Bond
- Cuts Labor, Cuts Downtime

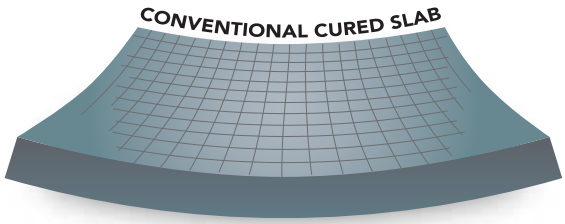
ADDITIONAL BENEFITS

@EarlyAge Concrete

- Transparent in mix - Elliminates Frequent Testing
- No Corrosion Inhibitors
- Promotes Best Concrete Practice

@Profile&Polish Concrete

- Eliminates curling of the slab. As a result, the polishing reveals the same amount of aggregate between the edge and the interior of the slab, even at construction joints. even aggregate reveal for polished concrete.



GREENCANVAS SLAB

CUT LABOR

Few/No Joints Cut
Few/No Joint Filler Required
No Need for Separate Sub Contractors to Cut or Install Joints & Joint Filler
Place Larger Monolithic Pours

CUT ENVIRONMENTAL IMPACT

Eliminate Unsightly Shrinkage Cracking
Less Intrusion for Sustainable Concrete
Joint Filler Limited/Eliminated Results in a More Sustainable Slab
No need for epoxy-coated re-bar thanks to mechanical bond.

CUT DOWNTIME

No Need to Schedule Concrete Cutting Contractors
No Need to Schedule a Contractor to Fill Joints
Complete Projects Using Larger Monolithic Pours
Extends forklift and factory vehicle life

TECHNICAL INFORMATION

Appearance:
GreenCanvas Expansive Components is cementitious, with consistency and physical characteristics similar to Portland cement.

Specific Gravity:
(2.8 Avg)

pH:
(13)

Packaged:
Water Soluble Bags, in Pails: 40 lb. (18.1 kg)
Water Soluble Bags, without Pail: 40 lb. (18.1 kg)

Bulk:
10-ton minimum (Dedicated storage required)
Shelf Life:
Six months to one year in original, unopened pails.
Two to six months in original, unopened 40 lb. bags.*

STORE IN A DRY LOCATION

In all cases, consult the Technical Data Sheet and Safety Data Sheet before use.
SDS available at
www.GreenCanvasConcrete.com

WITHOUT GREENCANVAS

Common Issues: Curling at the Edges and Joints
Joints Cut & Filled
Dry Shrinkage Cracking

WITH GREENCANVAS

Reduce/Eliminate: Curling
Joints
Dry Shrinkage Cracking

ESTIMATING

Dosage:
GreenCanvas can be used at a rate as low as 4% up to -12% or greater, depending on the specific application or required specification. Please consult a representative for more information. Engineering services available upon request. The concrete needs to be designed to provide proper shrinkage compensation.

GreenCanvas is sold as a shrinkage compensating concrete with a dosage rate of 4%-10% of the cementitious material.

Restrained: 4%-10% (ASTM C878)

Unrestrained: 10%.

ASTM C878 tests can be done and reviewed for best performance.

Storage: Clean and dry. GreenCanvas is sensitive to humidity, free water, and CO2 and should be stored and handled in the same manner as Portland cement. Keep in the correctly sealed, original package and in a dry location. Water-soluble bags can be mixed in trucks without disposal concerns (follow mixing directions).

Shelf Life: Packaging procedures for quality assurance require custom manufacturing of GreenCanvas for each shipment. The shelf-life of GreenCanvas is the same or less than that of cement. Plan to order 4+ weeks before placement date for production & best rates/shipping.

Water Soluble Bags: Use all material within two months of receipt.

Pails: Water Soluble Bags shipped/stored in pails may be stored up to one year when adequately sealed.

Bulk: Clean, dry, dedicated silo. Use all material within two months of receipt.

Batch plant mixing - GreenCanvas may be added at concrete suppliers' plant by adding the specified dosage of the component uniformly to achieve complete distribution throughout the batch, to either the cement or the sand as it is being batched. Concrete shall then be thoroughly mixed as per the concrete supplier's standard method. If necessary, a component can be added at the batch plant following the method described in 'Job site mixing'.

Job site mixing: The approved concrete mix for the specified strength shall be delivered to the job site. GreenCanvas at the specified dosage, and water, at the specified water/cementitious ratio for the amount of component added, shall be added to the truck and mixed as follows

prior to placement. The truck shall be run at mixing speed for 3 minutes and then backed up until the concrete reaches the discharge point. This procedure shall be repeated two more times, and the concrete can then be discharged after the third mixing cycle.

Note that the addition of GreenCanvas to the concrete will increase the strength slightly, slightly decrease the slump and slightly increase the temperature of the concrete. Best practice is to perform a trial batch to assess the impact on the concrete, familiarize the team with mix, placement and performance of GreenCanvas.

SPECIFIERS NOTE:

Shrinkage Compensating Concrete made with GreenCanvas allows the design engineer and the contractor to eliminate many of the contraction joints associated with traditional concrete design and construction. Larger monolithic designs can often eliminate expansion joints between adjacent placements. Expansion joints placed for thermal expansion of linear elements are determined by thermal considerations that are not changed by SCC. Joint design should be in accordance with ACI 223.

Works Independently

Green Canvas' expansive properties occur independently of any other materials reacting within a concrete mix and can be used, not just with Portland cement but also with slag, fly ash, silica fume, etc. GreenCanvas can be used with any admixtures meeting ASTM C-494, including such exotic materials as viscosity modifiers, corrosion inhibitors, and the latest forms of plasticizers and virtually all cements meeting ASTM C-150, including, but not limited to Types I, II, Ill, IV, V, LA, IP, IA, & slag cement. As with any admixture system, trial batching is recommended to identify any incompatibility prior to production batching.

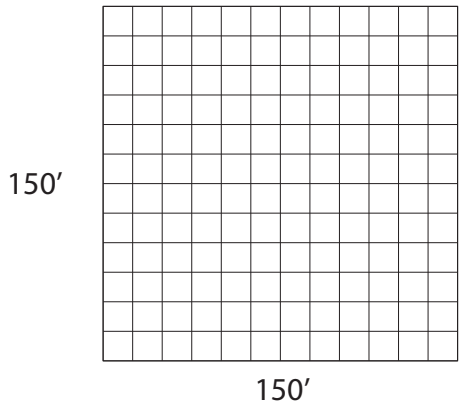
GreenCanvas Is Not An SRA (Shrinkage Reducing Admixture (ASTM C494 Type S))

Shrinkage Reducing Admixtures are commonly used in liquid or powder form in concrete mixing prior to placement. SRA's have been shown to reduce shrinkage by 50-60% at 28 days and 40-50% at 12 weeks. SRA's typically produce a delay in the initial set and an increase in the time between the initial and final set consistently. The use of an SRA results in a retardation of temperature development for high w/c ratios.

SRA's result in a lower compressive strength, tensile strength, flexural strength, and modulus of elasticity. These admixtures reduce but do not eliminate drying shrinkage. GreenCanvas is a component that may be added to the mix without having a negative effect onset time or placement consistency. The restrained, controlled expansion results in an elimination of shrinkage and curling stresses.

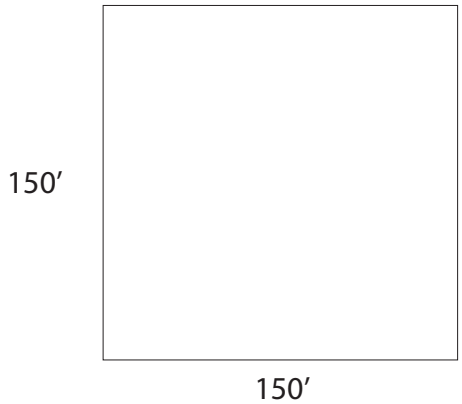
UNDERSTANDING JOINT IMPACT

Standard Slab



1. A 6" thick conventional concrete slab measuring 150' x 150'; 22,500 sq.ft., will typically have 3,300 linear feet of control joints and 144 independent panels.
2. This slab will experience curling at the control joints, panel movement, and joint deterioration due to movement.
3. Multiple concrete placements are required.
4. This slab will have many joints that require care and maintenance and will have a limited service life and expanded equipment maintenance due to wear and tear.

GREENCANVAS Slab



1. A 6" cement concrete or slab measuring 150'x150'; 22,500 sq.ft., compensated for shrinkage with GreenCanvas, will have NO CONTROL JOINTS, and thus, no individual panel movement.
2. There will be far fewer joints, requiring less care and maintenance, and will provide for greatly extended service life with the lowest life cycle cost—potential savings of up to 4,500 linear feet of cutting and jointing material placement and maintenance.
3. This slab will function as a single unit and will not require additional systems to load transfer across the concrete slab.
4. This slab can be accomplished with a single concrete placement (the entire 22,500 SF).

SUGGESTED SHORT-FORM SPECIFICATION

Masterformat

03 31 19 Shrinkage-Compensating Concrete

GreenCanvas Shrinkage-Compensating Concrete shall be in accordance with the following:

Materials

A. Shrinkage-Compensating concrete shall be made by the addition of a Type G shrinkage-compensating component to an approved standard concrete mix design in accordance with the following:

1. Concrete mixing, placing, finishing, and curing shall be in accordance with ACI 223R-10 "Standard Practice for the Use of Shrinkage-Compensating Concrete" and manufacturer's recommendations.
2. Component shall be a calcium hydroxide platelet system, Type G, added to an approved concrete mix design using Type I, II, or V Portland cement conforming to ASTM C150. The component shall be added at a rate of 8 to 10% by weight of cementitious material in the standard concrete mix design. GreenCanvas, a Type G Shrinkage-Compensating component, manufactured and marketed by Green Umbrella, is pre-approved. Contact information 870-917-2054.
3. The specified water/cement ratio of the standard concrete mix design shall be maintained, and the water content shall be increased accordingly since the shrinkage-compensating component is a cementitious material. GreenCanvas weight shall be used in the water: cementitious materials ratio calculation
4. Shrinkage Reducing Agents are not an acceptable substitute for Shrinkage-Compensating Concrete and will not be approved as an "or equal" substitute.

B. Shrinkage-Compensating Concrete shall have an expansion of .03% to .10% at seven days when tested in accordance with ASTM C 878, Standard Test Method for Restrained Expansion of shrinkage-compensating concrete, and shall meet the expansion requirements stated on the project engineering drawings.

C. In shrinkage-compensation applications, steel reinforcing shall have a reinforcement ratio of 0.15%. Steel reinforcing specified as temperature steel for crack control normally meets this requirement and can be used for both purposes. Care should be taken to place the reinforcement in the upper 1/3 of the slab.

D. For calcium hydroxide component systems, admixtures shall conform to ASTM C494.

Execution

A. Shrinkage-Compensating concrete shall be made by either of the following methods.

1. Job site addition - The approved concrete mix for the specified strength shall be delivered to the job site. The shrinkage-compensating component, at the specified dosage, and water, at the specified water/cementitious ratio for the amount of component added, shall be added to the truck and mixed as follows before placement. The truck shall be run at mixing speed for 3 minutes and then backed up until the concrete reaches the discharge point. This procedure shall be repeated two more times, and the concrete can then be discharged after the third mixing cycle.
2. Batch plant addition - Shrinkage-Compensating component may be added at concrete suppliers' plant by adding the specified dosage of the component in a uniform manner, to achieve complete distribution throughout the batch, to either the cement or the sand as it is being batched. Concrete shall then be thoroughly mixed as per the concrete supplier's standard method. If necessary, a component can be added at the batch plant following the method described in 'Job site addition'.

B. Cure in accordance with specified curing methods for Portland Cement concrete. Curing membrane, if used, shall be applied so as to provide 95% retention of moisture in the concrete.

C. Quality Assurance, TQM, and packaging procedures require that we custom manufacture GreenCanvas for each shipment. The shelf-life of GreenCanvas, although the product is cementitious, is less than that of cement. Recommendations are to use all material within two months of receipt in bags. GreenCanvas in pails can be stored much longer, from six months to one year.

Product Placement

Placement: Standard ACI practices

Water: GreenCanvas is a cementitious material. The specified W/C ratio a small additional amount of water will have to be added to the mix design. GreenCanvas is calculated as part of the cementitious material, i.e. Portland cement 450 lbs/cu.yd + fly ash 60 lbs/cu.yd + GreenCanvas 50 lbs/cu. yd.= total cementitious of 560 lbs/cu.yd. At a W/C of 0.45, the water content will be 252 lbs/cu. yd

Important Note: As a cementitious product, GreenCanvas must be considered in W/C calculation. If an absolute 27 cubic foot design is paramount, a deduction in the amount of fine aggregate based upon a specific gravity of 3.3 for the expansive component should be considered.

Slump: GreenCanvas should be added to the batch plant standard mix that meets project specifications. Without a concrete spec or a minimum partial spec, Green Umbrella recommends the concrete slump from water should be 3"- 5". For more plasticity, a plasticizer or a water reducing agent should be used.

Slump loss: No change

Air: Has no effect on maximum water retention in the slab.

ENVIRONMENTAL RESPONSIBILITY AND LEED CONSIDERATIONS

GreenCanvas is easy to use, and because the process is simple a reduction in labor results from the lack of control joints, fewer laborers are required. GreenCanvas has low VOCs and has a minimal impact on indoor air quality. Sustainable Building Practices with LEED point opportunity including Water Conservation Elements, VOC.

Please ask a Consultant for more details:
Life Cycle is 2 to 3 times longer, reduces or eliminates joint maintenance naturally found component. All the following can be documented: Cuts Labor, Cuts Downtime, and Reduces Handling and Packaging.

Optimize Energy Performance
Allows the advantage of utilizing the thermal mass of concrete in heating and cooling.

- Provides the ability to increase the benefit of ambient natural lighting and/or reduce the required lampage.

Building Reuse/Construction Waste Management/Recycled Content

- Existing Buildings - Environmental stewardship through the reuse of existing floor.
- New or Existing Buildings - Not wasting materials or energy required to produce a floor covering or topical coating.

VOC/IAQ/Long-term Maintenance

- Zero VOC content.
- Many studies indicate that indoor air quality is enhanced with properly maintained hard surfaces vs. carpet.
- Does not support combustion, nor does it produce smoke or toxic fumes.

Life Cycle Cost

- Sources show concrete to be the lowest life-cost flooring option available.

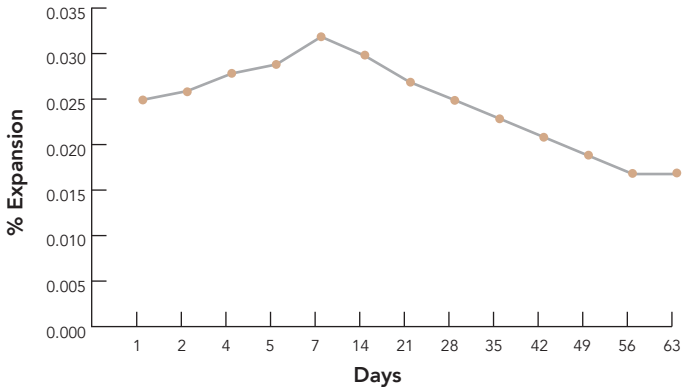
STANDARDS AND TESTING

Green Canvas Type "G" Expansive Component is governed by ACI 223R-10.

Performance criteria by ASTM C-878 Standard Test Method for Restrained Expansion of Shrinkage

ASTM C878 C878M - 09 Standard Test Method for Restrained Expansion of Shrinkage-Compensating Concrete
ASTM C-806 - Standard Test Method for Restrained Expansion of Expansive Cement
Mortar
ASTM C-157 -Modified Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
ASTM C-33 - Standard Specification for Concrete Aggregates and water shall be potable.
ASTM C 494 Standard Specification for Chemical Admixtures for Concrete
ACI 223R-10 Guide for the Use of Shrinkage Compensating Concrete.

The expansion percentages below represent the latest ASTM C-878 available.



Days	% Expansion
1	0.025
2	0.026
4	0.028
5	0.029
7	0.032
14	0.03
21	0.027
28	0.025
35	0.023
42	0.021
49	0.019
56	0.017
63	0.017

Mix	
Cement	564
CA	1750
FA	1163
W/C	0.44
GreenCanvas	10%
Initial	8 hrs. 15 min.
Final	11 hrs. 20 min.

STRUCTURAL DESIGN CONSIDERATIONS

Base Preparation:
The base will be smooth, well compacted, and the surface saturated but free of standing water. A vapor barrier may be used.

Reinforcement:
Minimum shrinkage reinforcement ratio of 0.15% shall be provided. Reinforcing shall be in the top half of the slab with minimum cover as recommended by ACI.

Joints:
Joints shall be designed and constructed in accordance with ACI 223 "Guide for the Use of Shrinkage Compensating Concrete".

SAFE HANDLING/FIRST AID

GreenCanvas has the same properties as cement and should be handled like cement and stored in a dry area. If one comes into contact with the skin, irritation may occur. Wash with soap and water and flush thoroughly with water.

SECTION 16. OTHER INFORMATION

HEALTH	FIRE	REACTIVITY/ INSTABILITY
4 Deadly	4 May Detonate	4 <73°C
3 Extreme Danger	3 Explosive	3 <100°C
2 Dangerous	2 Unstable	2 <200°C
1 Slight Hazard	1 Normally Stable	1 >200°C
0 No Hazard	0 Stable	0 Will Not burn

HAZARDOUS MATERIAL INFORMATION (HMIS)

Health	1
Fire	0
Reactivity	0
Personal Protection	C

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

Health	1
Fire	0
Instability	0
NA	

WARRANTY INFORMATION

GreenCanvas is warranted to meet ACI 223 requirements for an Expansive component Type "G". Warranty is limited that under our control, it will meet such. Warranty is limited to the purchase price of quantity used. Quality Assurance, TQM, and packaging procedures require that we custom manufacture GreenCanvas for each shipment. Recommendations are to use all material within two months of receipt in water-soluble bags. GreenCanvas bags delivered in pails can be stored up to one year.

WEBSITE & ADDITIONAL INFORMATION

Productions Team, Inc.
P.O. Box 644
Mulberry, AR 72947
870-917-2054
www.ProductionsTeamInc.com
www.GreenCanvasConcrete.com