CSS-CM

Cementitious Matrix

DESCRIPTION

CSS-CM is a one-component, shrinkage-compensated, polypropylene-fiber-reinforced cementitious matrix designed to be field installed with CSS-UCG, CSS-BCG and CSS-HBCG carbon grids to create a fabric-reinforced cementitious matrix (FRCM) composite for structural reinforcement applications. Used without carbon grids, CSS-CM functions as a high-performance, sprayable repair mortar. This product has been evaluated per ICC-ES AC434 for concrete and unreinforced masonry strengthening and is part of the tested assembly in UL Design No. N859, which achieved a four-hour fire rating when subjected to ASTM E119 / UL 263 full-scale fire testing. Please refer to UL Online Certifications Directory for the UL listing.

CODES

ICC-ES ESR-3506

MATERIAL PROPERTIES

Matrix Properties

Unit Weight	140 lb./ft.^{3} (2,240 kg/m^3)
Set Times (ASTM C191)	**Initial Set:** <5 hr. **Final Set:** <8 hr.

Matrix Test Properties[1]

Property	Design Value
Tensile Modulus (ASTM C469)	3,880,000 psi (26.8 GPa) @ 28 days
Rapid Chloride Permeability (ASTM C1202)	<500 coulombs (very low) @ 28 days
Freeze/Thaw Resistance (ASTM C666, Proc. A)	93.7% RDM @ 300 cycles
Salt Scaling Resistance (ASTM C672)	0.06 lb./ft.^{2} (very slight) @ 50 cycles
Sulfate Resistance (ASTM C1012)	+0.02% @ 6 mo.
Direct Tensile Bond Strength (ASTM C1583)	28 day: 390 psi (2.7 MPa)
Direct Shear Bond Strength (Michigan DOT)	28 day: 300 psi (2.1 MPa)
Slant Shear Bond Strength (ASTM C882, mod.)	28 day: 2,630 psi (18.1 MPa)
Splitting Tensile Strength (ASTM C496)	28 day: 700 psi (4.8 MPa)
Flexural Strength (ASTM C348)	28 day: 1,000 psi (6.9 MPa)
Compressive Strength (ASTM C109)	1 day: 3,000 psi (21 MPa) 7 day: 6,300 psi (43 MPa) 28 day: 7,500 psi (52 MPa)
Drying Shrinkage (ASTM C157, mod.[2])	-0.09% @ 28 days

1. The data herein is based on laboratory testing under controlled conditions. Variations may result from mixing methods and jobsite conditions. All testing performed at 73°F (23°C) and 50% R.H., unless otherwise noted. Results were obtained using 0.72 US gallons (2.7 L) water per 55 lb. (25 kg) bag.
2. ASTM C157 modified: 3"x3"x11.25" specimens air cured at 50% RH and 73°F.

PERFORMANCE FEATURES

- High strength
- Ambient cure
- Non-corrosive
- Molds to fit various shapes
- Low aesthetic impact
- Compatible with many finish coatings
- UL listed (www.ul.com/database) FRCM system
- Sprayable repair mortar
- Low rebound
- Long working time
- Single component mortar

APPLICATIONS

Seismic Retrofit
- Shear strengthening
- Displacement/ductility
- Life safety

Concrete Restoration
- Horizontal/Vertical/Overhead applications

Load Rating Upgrade
- Increased live loads
- New equipment
- Change of use

Damage Repair
- Deterioration/corrosion
- Blast/vehicle impact

Defect Remediation
- Size/layout errors
- Low concrete strengths

Blast Mitigation
- Progressive collapse

STRUCTURES

- Buildings
- Bridges
- Parking garages
- Chimneys
- Piers/wharfs
- Tunnels
- Pipes

ELEMENTS

- Columns
- Beams
- Slabs
- Walls
- Piles
- Pier caps

SUBSTRATES

- Concrete
- Masonry

PACKAGING

Bag Size
55 lb. (24.9 kg)

Model No.
CSS-CM

MADE IN USA with GLOBAL MATERIALS

CLASSIFIED C UL US

FIRE RESISTANCE CLASSIFICATION FOR USE IN BEAM/SLAB REINFORCING SYSTEM <R37897>

FRCM Design
The number of layers, dimensions, and detailing of FRCM system shall be designed in accordance with ACI 549 or another recognized design guideline/code in order to meet the design performance specified for the application. Contact Simpson Strong-Tie for design and technical support.

Surface Preparation
Prepare surface and any exposed reinforcement per ICRI Guideline No. 310.1R. Concrete shall be prepared to achieve a minimum ¼" (6 mm) amplitude (CSP-6-9 in accordance with ICRI Guideline No. 310.2R) by means of sand blasting, shot blasting, or water blasting. Application surfaces shall be clean, sound, and free of standing water at time of application. All dust, laitance, grease, curing compounds, and other foreign materials that may hinder the bond must be removed before installation. All corners to be covered with grid and matrix shall be rounded to a ¾" (19 mm) minimum radius using a grinder. Wet the substrate for at least 24 hours to a saturated surface dry condition prior to CSS-CM application.

Mixing
Start with 90% of the total mixing water recommendation depending on the desired consistency of the shot mortar. Consult the printed instructions on the product package for the maximum recommended amount of mixing water. Mix with a mechanical mixer at least 3 minutes adding the remaining 10% of the recommended total water if necessary until a homogeneous mixture with the desired consistency is formed. The mixture should rest 1 minute and then remixed another 10 seconds before applying. Do not add additional water after the setting process is started.

Application
FRCM installation shall be performed only by contractors and personnel that have been properly trained by Simpson Strong-Tie. CSS-CM can be sprayed with traditional shotcrete or low pressure spray equipment. CSS-CM cementitious matrix can be used in single lifts up to 2" (51 mm). For FRCM applications, place ¼"–½" (6–13 mm) layer of CSS-CM cementitious matrix, then immediately set CSS grid into wet CSS-CM layer. Follow with additional layers of CSS grid, if required, set into ¼"–½" (6–13 mm) layers of CSS-CM. Finish with a final layer of CSS-CM at ¼"–½" (6–13 mm) thick and screed/trowel to desired finish. CSS-CM layers should be installed wet on wet for best performance and minimal surface preparation. When multiple layers of CSS-CM are expected to be installed after the initial product set, existing layers should be profiled or roughened prior to the initial set and kept moist until the next layer is installed. Hardened layers must be cleaned with water pressure prior to installation of subsequent layers.

Curing
Installation shall be kept humid and protected against heat and wind for 3 to 5 days by wet curing or using an ASTM C309 compliant water-based curing compound. The use of curing compounds may affect adhesion of subsequent surface treatments. SSD surface conditions and proper curing procedures are critical at minimum application thickness to prevent premature drying or cracking.

Yield
A 55 lb. (24.9 kg) bag of CSS-CM will yield approximately 0.43 $ft.^3$ (0.012 m^3) of finished material.

Limitations
FRCM applications shall take place only when the ambient and substrate temperatures are between 41°F (5°C) and 86°F (30°C). Not compatible with solvent-based curing compounds. Avoid contact with aluminum surfaces. Site conditions can greatly affect cure times.

AS A REPAIR MORTAR ONLY: Follow ACI 305 and ACI 306 for hot or cold weather installations beyond the recommended installation temperature range. Minimum application thickness is ⅜".

CAUTION

May cause serious eye and skin irritation or damage. When combined with water may cause moderate to severe alkali burns. Contains silica; do not breathe dust.

Protective Measures: The use of safety glasses and chemically resistant gloves is recommended. Use appropriate clothing to minimize skin contact. The use of a NIOSH-approved respirator is required to protect respiratory tract when ventilation is not adequate to limit exposure below the permissible exposure limit (PEL). Refer to Safety Data Sheet (SDS) available at **strongtie.com/sds** for detailed information.

FIRST AID

Eye Contact: Immediately flush eyes with plenty of cool water for at least 15 minutes while holding the eyes open. If redness, burning, blurred vision, or swelling persists, seek medical advice.

Skin Contact: Remove product and wash affected area with soap and water. Do not apply greases or ointments. Remove contaminated clothing. Wash clothing with soap and water before reuse. If redness, burning, or swelling persists, seek medical advice.

Ingestion: DO NOT INDUCE VOMITING. CONSULT A PHYSICIAN OR POISON CONTROL CENTER IMMEDIATELY FOR CURRENT INFORMATION. Never administer anything by mouth to an unconscious person. Rinse mouth out with water. Never leave affected person unattended. If vomiting occurs spontaneously, lay affected person on their side, keeping head below hips to prevent aspiration of material into lungs.

Inhalation: Remove affected person to fresh air. If affected person continues to experience difficulty breathing, seek medical advice.

CLEAN-UP

Spills: Sweep or vacuum material and place in a suitable container. Keep out of sewers, storm drains, surface waters, and soils.

Surface Clean: Remove any residue with hot soapy water. Cured material can be removed only by mechanical means.

Tools and Equipment: Clean with soap and water immediately after use.

Skin: Use a non-toxic pumice-based soap, citrus-based hand cleaner, or waterless hand-cleaner towel. Never use solvents to remove product from skin.

Disposal: Dispose of container and unused contents in accordance with federal, state, and local requirements. Containers may be recycled; consult local regulations for exceptions.

SHELF LIFE

1 year in unopened packaging.

STORAGE

Store material in a dry area with no exposure to moisture.

LIMITED WARRANTY

This product is covered by the Simpson Strong-Tie RPS Product One-Year Limited Warranty, which is available at **strongtie.com/limited-warranties** or by calling Simpson Strong-Tie at (800) 999-5099.