

# CSS-CMT

Cementitious Matrix — Sprayable and Trowelable



## DESCRIPTION

CSS-CMT is an innovative, polymer-modified, one-component, shrinkage-compensated cementitious matrix enhanced with polypropylene fibers. This advanced material is engineered for field installation using sprayed or trowel-applied methods. When used in conjunction with CSS-UCG, CSS-BCG and CSS-HBCG carbon grids, it forms a fabric-reinforced cementitious matrix (FRCM) composite ideal for structural reinforcement applications. Without the carbon grids, CSS-CMT serves as a high-performance trowelable and sprayable repair mortar.

## MATERIAL PROPERTIES

### Matrix Properties

Property	Trowel Mix — Design Value	Sprayable Mix — Design Value
Unit Weight (ASTM C138)	135 lb./ft. <sup>3</sup> (2,162 kg/m <sup>3</sup> )	134 lb./ft. <sup>3</sup> (2,146 kg/m <sup>3</sup> )
Set Times (ASTM C191)	<b>Initial Set:</b> <5 hr. <b>Final Set:</b> <6 hr.	<b>Initial Set:</b> <5 hr. <b>Final Set:</b> <8 hr.

### Matrix Test Properties<sup>1</sup>

Property	Trowel Mix — Design Value	Sprayable Mix — Design Value
Rapid Chloride Permeability (ASTM C1202)	280 Coulombs @ 28 days	970 Coulombs @ 28 days
Direct Tensile Bond Strength (ASTM C1583)	28 day: 310 psi (2.1 MPa)	28 day: 260 psi (1.8 MPa)
Slant Shear Bond Strength (ASTM C882, mod. <sup>2</sup> )	28 day: 1,700 psi (11.7 MPa)	28 day: 2,300 psi (15.9 MPa)
Splitting Tensile Strength (ASTM C496)	28 day: 1,000 psi (6.9 MPa)	28 day: 700 psi (4.8 MPa)
Flexural Strength (ASTM C348)	28 day: 1,300 psi (8.9 MPa)	28 day: 1,200 psi (8.3 MPa)
Compressive Strength (ASTM C109)	1 day: 2,000 psi (13.79 MPa)	1 day: 1,500 psi (10.34 MPa)
	7 day: 5,000 psi (34.48 MPa)	7 day: 4,000 psi (27.58 MPa)
	28 day: 7,000 psi (48.27 MPa)	28 day: 6,000 psi (41.37 MPa)
Drying Shrinkage, Wet (ASTM C157)	0.030% @ 28 days	-0.007% @ 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 (25°C) and 50% R.H., unless otherwise noted. Results for the trowel mix were obtained using 0.89 US gallons (3.3 L) water per 55 lb. (25 kg) bag. Results for the sprayable mix were obtained using 1.06 US gallons (4.0 L) water per 55 lb. (25 kg) bag.

2. Modified per ASTM C928.

## PERFORMANCE FEATURES

- High strength
- Ambient cure
- Noncorrosive
- Low aesthetic impact
- Compatible with many finish coatings
- Sprayable and trowelable repair mortar
- Low rebound
- Long working time
- Single component mortar
- Polymer-Modified Composition

## 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-CMT



**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, standard or 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. Abrasive surface preparation is not need for masonry substrates. 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-CMT application.

**Mixing**

Start with 90% of the total maximum mixing water depending on the desired consistency of the mortar. See below for the maximum amount of mixing water. Mix with a mechanical mixer at least 3 minutes, adding the remaining 10% of the 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 water after the setting process is started.

**Maximum Mixing Water:**

Trowel Mix 0.89 US gallons (3.3 L) per 55 lb. (25 kg) bag

Sprayable Mix 1.06 US gallons (4.0 L) per 55 lb. (25 kg) bag

**Application**

FRCM installation shall be performed only by contractors and personnel that have been properly trained by Simpson Strong-Tie. CSS-CMT can be sprayed with traditional shotcrete, low pressure spray equipment or hand applied using a trowel. For FRCM applications, place ¼"-½" (6-13 mm) layer of CSS-CMT cementitious matrix, then immediately set CSS grid into wet CSS-CMT layer. Follow with additional layers of CSS grid, if required, set into ¼"-½" (6-13 mm) layers of CSS-CMT. Finish with a final layer of CSS-CMT at ¼"-½" (6-13 mm) thick and screed/trowel to desired finish. CSS-CMT layers should be installed wet on wet for best performance and minimal surface preparation. When multiple layers of CSS CMT 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-CMT will yield approximately 0.45 ft.<sup>3</sup> (0.0127 m<sup>3</sup>) of finished material.

**Limitations****FRCM Application:**

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.

**Mortar Only Application:**

Follow ACI 305 or ACI 306 for hot or cold weather installations, respectively, beyond the recommended installation temperature range. Minimum application thickness is ⅜". CSS-CMT cementitious matrix can be used in single lifts up to 2" (51 mm).

**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](http://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 nontoxic 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

One 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](http://strongtie.com/limited-warranties) or by calling Simpson Strong-Tie at (800) 999-5099.

## IMPORTANT INFORMATION

It is the responsibility of each purchaser and user of each Product to determine the suitability of the Product for its intended use. Prior to using any Product, consult a qualified design professional for advice regarding the suitability and use of the Product, including whether the capacity of any structural building element may be impacted by a repair. As jobsite conditions vary greatly, a small-scale test patch is required to verify product suitability prior to full-scale application. The installer must read, understand, and follow all written instructions and warnings contained on the product label(s), Product Data Sheet(s), Safety Data Sheet(s), and the [strongtie.com](http://strongtie.com) website prior to use. For industrial use only by qualified applicators. KEEP OUT OF REACH OF CHILDREN!

 **WARNING!** Cancer — [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).