Division 03 54 13:
Gypsum Cement Underlayment

Hacker Industries, Inc.

Architect Binder

FIRM-FILL® CMD

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Hacker Industries, Inc.

SUBMITTAL FORM

FIRM-FILL® CMD

Floor Underlayment

Technical Data	Properties	ASTM
Weight	Minimum 12.8 lbs/ft^2 (62.47 kg/m^2) at 1-9/16” (40mm)	C472 M
Thickness	1” above the top of the flutes	
Compressive Strength	Minimum 3500 psi (24.1 MPa)	C472 M
Fire Hazard Classification	Flamespread index 0; Fuel Contribution 0; Smoke Density 0	E84
Sand	1/8” (3mm) or less washed plaster or masonry sand	E11

- For use in cold-formed steel frame construction with a corrugated steel deck
- Install over a resilient sound mat for additional sound isolation
- Lightweight solution for fast track construction
- Rapid set time; can be walked on in 2 hours
- Helps contribute points to LEED® project certification
- Creates a flat, durable surface for finished floor coverings
- Installed by Licensed Applicators across North America

Product Description

FIRM-FILL® CMD is designed for use in cold-formed steel frame buildings with a corrugated steel deck. FIRM-FILL® CMD provides minimum compressive strengths of 3500 psi (24.1 MPa).

FIRM-FILL® CMD is mixed on the job site with local sand (per ASTM E11) and water to create a light-weight slurry. A 1” (25mm) application is required above the top of the flutes. Maximum thickness is 2” (51mm) in one lift.

For residential and light-commercial construction, FIRM-FILL® CMD is a cost-effective method to build higher and faster. FIRM-FILL® CMD creates a smooth, hard surface for finished floor coverings while offering exceptional compressive strengths matched with superior acoustical control and fire resistance properties. For added sound isolation, use FIRM-FILL® CMD with a Hacker Industries, Inc. sound control mat.

Limitations

When considering the use of this floor system, a licensed structural engineer shall first evaluate the building loads and framing system to determine whether this corrugated steel deck system is appropriate.

FIRM-FILL® CMD is not a structural element and does not provide any contribution to the floor diaphragm. The corrugated steel deck shall be designed to address all floor diaphragm requirements and must conform to the Steel Deck Institute Standards, reference SDI Manual of Construction with Steel Deck. For additional requirements, contact Hacker Industries, Inc.

- Shall not be used in exterior locations, below grade, or where continuous exposure to moisture is likely.
- Shall not be used as a wear surface, must be covered by a finished floor covering.
- Structure shall be designed so that deflection does not exceed L/360 live or dead load. Certain floor coverings such as marble, limestone, travertine and wood may have more restrictive deflection limits. Consult the appropriate floor covering manufacturer for recommendations.
- No single application of FIRM-FILL® CMD shall exceed 2” in depth.
- FIRM-FILL® CMD is but one component of an effective sound and fire control system. Care must be taken in the installation of all components to assure the ultimate design performance. Published acoustical and fire system tests were conducted under controlled laboratory or field conditions and reflect results applicable only to those specific assemblies.

Installation

Before, during, and after the installation of FIRM-FILL® CMD, the building must be enclosed and the temperature maintained at a minimum of 50°F (10°C). After installation, temporary wood planking shall be placed by the GC wherever the floor underlayment will be subject to wheeled or concentrated loads. Prior to the installation of FIRM-FILL® CMD, the subfloor shall be structurally sound and be broom clean, dry and free from oil, grease, paraffin, laitance, wax or other contaminants.

Prime the corrugated steel deck with FIRM-FILL® CMD Primer per recommended specifications before installing underlayment. Adequate ventilation shall be provided by the General Contractor (GC) to ensure proper drying of FIRM-FILL® CMD. If necessary, the GC shall provide mechanical ventilation. Depending on thickness and drying conditions, the underlayment will dry within 10 to 14 days. To avoid potential problems during the drying process, the GC shall consult Hacker Industries, Inc.'s Drying Conditions Flyer and information contained on Hacker Industries, Inc.'s website for additional information concerning drying of this product.

Finished floor coverings can be installed when the FIRM-FILL® CMD is completely dry. Consult flooring contractor for recommended procedures to test for dryness and acceptable levels of moisture. Reference Hacker Industries, Inc.'s Guidelines for Installing Finished Floor Coverings. This guideline is not a warranty and shall be used as a guideline only.

Product Data

Approximate Compressive Strength (aggregated) ASTM C472 (modified):	Minimum 3500 psi* (24.1 MPa)
Approximate Dry Density (aggregated):	125 pcf

Note *Compressive strengths published herein were achieved under controlled laboratory conditions. Actual field results may differ due to environmental conditions, regional sand variations, inconsistent proportioning of field applied water, sand and Hacker Floor Underlayment, as well as differences in mixing/pumping equipment.

UL Designs

G565 G568 (Contact Hacker Industries, Inc. for other UL Designs)

Related Products

FIRM-FILL® CMD Primer, Hacker TopCoat™ SP and Hacker Floor Sealer are available for use with FIRM-FILL® CMD Floor Underlayment. Contact Hacker Industries, Inc. at (800) 642-3455 for more information.

Warranty

Subject to express warranty stated on Hacker Industries, Inc.'s website.

Submittal Approvals

Project Name:_____

Contractor/Architect: _____

Date:_____

Product Information
See HackerIndustries.com and bags for current recommended product specifications, literature and warnings.

WARNING!
When mixed with water, this product hardens and becomes extremely hot. DO NOT attempt to make a cast enclosing any part of the body using this material. Failure to follow these instructions may cause severe burns that may require surgical removal of affected tissue or amputation of limb. Portland cement is strongly alkaline. Direct contact can be corrosive and cause severe damage or chemical burns to eyes and wet, moist skin. Avoid contact with eyes and skin. Wear protective glasses and clothing. If eye contact occurs, immediately flush thoroughly with water for 30 minutes and seek medical advice. Inhalation of dust may be corrosive or cause chemical burns or irritation to nose, throat and respiratory tract.

Avoid breathing dust. Use a NIOSH/MSHA-approved dust respirator. Wash thoroughly with soap and water after use. Do not ingest. If ingested, call a physician. Product safety, call (800) 642-3455. **KEEP OUT OF REACH OF CHILDREN**.

NOTICE
We shall not be liable for incidental or consequential damages, directly or indirectly, sustained, nor for any loss caused by application of these goods not in accordance with current printed instruction or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within 30 days from date it was or reasonably should have been discovered.

SAFETY FIRST
Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read MSDS and literature prior to specification and installation.

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Firm-Fill® CMD

Build higher and faster with **Firm-Fill® CMD** *(corrugated steel deck) from Hacker Industries, Inc., the leader in poured cementitious floor underlayments.*

Designed for use in multi-family, commercial and institutional buildings with light-gauge steel framing and a corrugated steel deck, **Firm-Fill® CMD** *is a lightweight, high-strength gypsum concrete floor underlayment.*

Installed at 1" above the top of the flutes (1-9/16" total), **Firm-Fill® CMD** *reduces dead loads, which can significantly lower costs.*

- **The lightweight solution for fast-track construction**
- **UL floor/ceiling assembly G565; 1, 1-1/2 or 2 hour fire ratings**
- **Applied directly over primed corrugated steel deck**
- **Minimum compressive strength 3500 psi (24 MPa)**
- **Installed by trained, Licensed Applicators**

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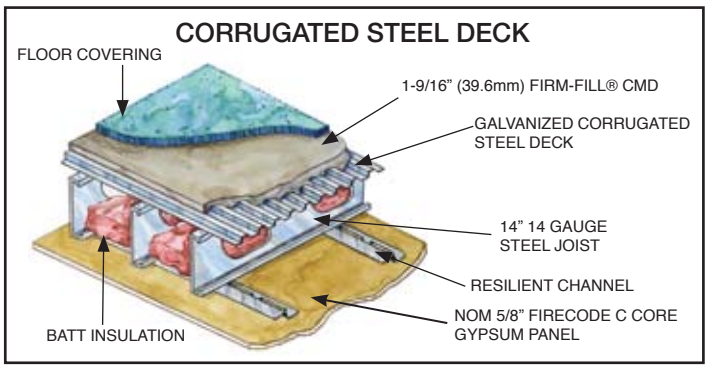

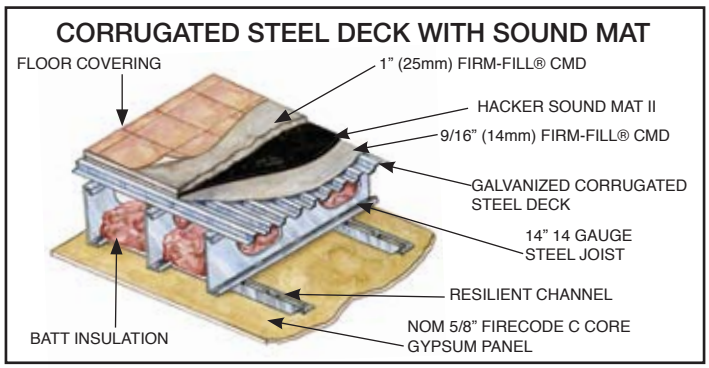

Recommended Specifications

PART I GENERAL

1.1 Scope – Specify to meet project requirements
- A. Work included:
  1. **FIRM-FILL® CMD**
  2. **FIRM-FILL® CMD** Primer
  3. Hacker TopCoat™ SP (Surface Prep)
  4. Optional: Sound Control Mat

1.2 Qualifications
- A. **FIRM-FILL® CMD** shall be installed by Licensed Applicators of Hacker Industries, Inc., using approved mixing and pumping equipment with a water meter.
- B. **FIRM-FILL® CMD** shall be delivered in original, unopened bags and protected from exposure to the elements after delivery. Do not allow bags to get wet.
- C. Before, during, and after installation of **FIRM-FILL® CMD**, the building interior shall be continuously ventilated and heated to a minimum of 50°F (10°C).
- D. Compressive strength shall be specified at a minimum of 3500 psi (24.1 MPa).
- E. **FIRM-FILL® CMD** is a non-structural, interior floor underlayment.
- F. All material specified herein shall be approved by Hacker Industries, Inc.

PART II PRODUCTS

2.1 Materials
- A. Gypsum Concrete: **FIRM-FILL® CMD** as supplied by Hacker Industries, Inc., Newport Beach, CA.
- B. **FIRM-FILL® CMD** Primer
- C. Hacker TopCoat™ SP, if specified.
- D. Optional: Hacker Sound Mat II or Quiet Qurl™ 55/025
- E. Sand: 1/8" (3mm) or less washed plaster or masonry sand that meets the requirements of Hacker Industries, Inc.'s Sand Guidelines.
- F. Mix Water: Potable and free from impurities.

PART III EXECUTION

3.1 Condition of Subfloor
- A. The General Contractor shall provide a structurally sound (L/360) metal deck with a minimum G60 galvinazation, broom cleaned, dry, and completely free of oil, grease, paraffin, wax, laitance or other contaminants. Subfloor shall meet other applicable structural standards, and be certified by a licensed structural engineer.
- B. Laps, where steel deck overlaps, are generally screwed together, and the deck is typically screwed to the joists. Maximum joist spacing shall be 24" on centers. Steel deck shall span across the joists, with deck ribs perpendicular to the joists.
- C. Before installation, the General Contractor shall inspect and approve the condition of the steel deck.

3.2 Preparation of Subfloor
- A. Leak Prevention: Areas where leakage could occur, including pipe penetrations, screw holes and laps, shall be caulked or sealed.
- B. Prime the subfloor using **FIRM-FILL® CMD** Primer. Reference Hacker Industries, Inc.'s Priming Instructions.

3.3 Mixing Instructions
- A. 4 to 4.75 gallons (15.1 to 17.9L) of water and sand as specified per 80-pound (36.3 kg) bag of **FIRM-FILL® CMD**. Do not overwater. Water amount will change with wetness of sand.
- B. **FIRM-FILL® CMD** mix proportions and methods shall be in strict accordance with Hacker recommendations.

3.4 Underlayment Application
- A. Scheduling: Application shall not begin until the building is enclosed.
- B. Application: The minimum thickness of **FIRM-FILL® CMD** is 1" (25mm) over the top of the flutes. Total pour thickness is 1-9/16" (39.6mm). Maximum thickness is 2" (51mm) in one lift.
- C. Protection: After installation, temporary wood planking shall be placed by the General Contractor wherever the underlayment will be subject to wheeled or concentrated loads.
- D. Drying: The General Contractor shall provide continuous ventilation and adequate heat to rapidly remove moisture from the area until the underlayment is dry. Do not install finished floor coverings until the **FIRM-FILL® CMD** is tested for dryness. Consult flooring contractor for recommended procedures to test for dryness. Reference Hacker Industries, Inc.'s Drying Conditions Flyer.
- E. **FIRM-FILL® CMD** is suitable for interior applications only and shall be covered by a finished floor covering.

3.5 Preparation for Installation of Floor Coverings
- A. Sealing: Any areas where the underlayment surface has been damaged shall be cleaned and sealed regardless of the specified floor covering. The floor covering manufacturer's specifications and requirements supercede these recommendations.
- B. Floor Covering Procedures: Please see the Hacker Industries, Inc.'s "Guidelines for Installing Finished Floor Coverings." The guideline is not a warranty and shall be used as a guideline only. Also see ASTM F2419 for recommended procedures.

3.6 Field Quality Control
- A. Slump Test: **FIRM-FILL® CMD** shall be tested for slump as it is being installed using a 2" by 4" (51mm by 102mm) cylinder. The patty size shall be 8-1/2" (216mm) plus or minus 1/2" (13mm) in diameter.
- B. Field Samples: Testing of molded cube samples shall be in accordance with ASTM modified C472 using split brass molds. Prior to independent sampling or testing, please request that proper ASTM methods are followed.

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Product Contributes Toward LEED® Credits

For the Licensed Applicator in your area, please call our toll-free number, (800) 642-3455.

FIRM-FILL® CMD Recommended Specifications

PART I. GENERAL

1.1 Scope

Specify to meet project requirements. The conditions of the Contract (General, Supplementary, and other conditions) and the General Requirements (sections of Division 1) govern the provisions of this section.

1.2 Qualifications

A. Supplier: Hacker Industries, Inc., Newport Beach, California.

B. Installer: Installation of FIRM-FILL® CMD shall be by a Licensed Applicator of Hacker Industries, Inc., using mixing and pumping equipment with a water meter approved by Hacker Industries, Inc.

C. All materials specified herein shall be approved by Hacker Industries, Inc., Newport Beach, CA. All others must receive prior approval.

D. Compressive strength shall be specified at a minimum of 3500 psi (24.1 MPa).

E. Materials shall be delivered in their original, unopened packages, and protected from exposure to the elements after delivery. Do not allow bags to get wet. Product shall not be used beyond shelf life.

F. Certification: Upon completion of this portion of the work and upon request, and as a condition of its acceptance, deliver to the architect a certificate from Hacker Industries, Inc., and signed by the Licensed Applicator, stating that the material used in this work complies with the specified requirements.

PART II. PRODUCTS

2.1 Materials

A. Gypsum Concrete: FIRM-FILL® CMD, as supplied by Hacker Industries, Inc.

B. Subfloor Primer: FIRM-FILL® CMD Primer, or equal as approved by Hacker Industries, Inc.

C. Sand: 1/8” (3mm) or less washed plaster, masonry sand or silica sand

D. Water: Potable and free from impurities

E. Hacker TopCoat™ SP (if specified).

2.2 Mix Design: See section 3.3

PART III. PREPARATION

3.1 Condition of Subfloor

A. Subfloor shall be structurally sound (minimum L/360 live or dead load), broom clean, dry and free from oil, grease, paraffin, laitance, wax or other contaminants before the arrival of the Hacker Licensed Applicator. Subfloor shall meet other applicable structural standards, and be certified by a structural engineer.

B. Laps, where steel deck overlaps, are generally screwed together, and the deck is typically screwed to the joists. Maximum joist spacing shall be 24” on centers. Steel deck shall span across the joists, with deck ribs perpendicular to the joists. Contact Hacker Industries, Inc. Licensed Applicator for additional questions regarding joists and laps.

C. Leak Prevention: All cracks and voids should be filled with a quick-setting patching or taping compound or equal where leakage could occur.

D. Before installation, the GC shall inspect and approve the condition of the subfloor and check elevations.

3.2 Priming

Apply FIRM-FILL® CMD primer by pouring onto the deck and spreading out with a push broom at rate of 300 sq. ft./gal.; do not thin. Primer may also be sprayed onto the deck, but it is imperative to achieve a continuous uniform coating. Allow 3 hours for adequate drying to a maximum of 24 hours before pouring the FIRM-FILL® CMD floor underlayment. Reference Hacker Industries, Inc.’s Priming Instructions for FIRM-FILL® CMD.

3.3 Mixing Instructions

A. 4 to 4.75 gallons (15.1 to 17.9L) of water and sand as specified per 80 pound (36.3 kg) bag of FIRM-FILL® CMD. Do not over water. Water amount will change with wetness of sand.

B. FIRM-FILL® CMD mix proportions and designs shall be in strict accordance with Hacker recommendations.

3.4 Underlayment Application

A. Scheduling:

1. Installation of FIRM-FILL® CMD shall not begin until the building is enclosed, including roof, windows, doors and other openings.

2. FIRM-FILL® CMD must be installed before the installation of drywall.

B. Application:

1. Minimum thickness of FIRM-FILL® CMD is 1” (25mm) over the top of the flutes. Maximum thickness is 2” (51mm).

2. Install FIRM-FILL® CMD by placing bags, sand and water into the approved high-speed mixing device and blend for a minimum of one minute. FIRM-FILL® CMD shall be pumped onto floor areas, spreading and screeding to a smooth surface at specified thickness. Place as continuously as possible until installation is complete so that no FIRM-FILL® CMD slurry is placed against FIRM-FILL® CMD that has obtained its initial set, except at authorized joints.

3. FIRM-FILL® CMD is suitable for interior applications only and must be covered by a finished floor covering.

C. Protection: After installation, temporary wood planking shall be placed by the GC wherever the floor underlayment will be subject to wheeled or concentrated loads. The GC shall not place concentrated loads such as pallets of material, drywall, taping compounds or any heavy materials, which may cause deflection in the middle of the floor.

D. Drying: Before, during and after installation of FIRM-FILL® CMD, building interior must be ventilated and heated to a minimum 50°F (10°C) to assure completion of the drying process. The GC shall supply mechanical ventilation, if necessary. Do not install finished floor coverings until the FIRM-FILL® CMD is tested for dryness. Consult flooring contractor for recommended procedures to test for dryness and acceptable levels of moisture. To avoid potential problems during the drying process, the GC shall consult Hacker Industries, Inc.'s Drying Conditions Flyer and information contained on Hacker Industries, Inc.'s website for additional information concerning drying of this product.

3.5 Preparation For Installation of Floor Coverings

A. Sealing: Any areas where the underlayment surface has been damaged shall be cleaned and sealed regardless of floor covering specified. Floor covering manufacturers' specifications and requirements supersede these recommendations.

B. Floor Covering Procedures: Please see the Hacker Industries, Inc.'s "Guidelines for Installing Finished Floor Coverings". The guideline is not a warranty and should be used as a guideline only.

3.6 Field Quality Control

A. Slump Test: FIRM-FILL® CMD shall be tested for slump at the beginning of each installation in order to establish the required slump. Slump tests shall then be taken periodically during installation to verify that the required slump is maintained. Slump tests shall be conducted using a 2" by 4" (51mm by 102mm) cylinder. The acceptable patty size shall be 8-1/2" (216mm) plus or minus 1/2" (approx. 13mm) in diameter.

B. Field Samples: Testing shall be done in accordance with ASTM C472 Modified testing procedures using split brass molds. Prior to independent testing, consult Hacker Industries, Inc. for proper ASTM procedures.

Warranty: *Subject to express warranty stated on Hacker Industries, Inc.'s website.*

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FIRM-FILL® CMD
Project References

Designed for use in multi-family, commercial and institutional buildings with light-gauge steel framing and a corrugated steel deck, FIRM-FILL® CMD is a lightweight, high-strength gypsum concrete floor underlayment. Installed at 1” above the top of the flutes (1-9/16” total), FIRM-FILL® CMD reduces dead loads and thickness, significantly lowering costs. Below is a small sample of project that have utilized FIRM-FILL® CMD.

Contractor:	East Coast Builders
Project:	Holiday Inn Express
Location:	Havelock, North Carolina
Description:	39,364 sq. ft. of FIRM-FILL CMD

Contractor:	Canan-Titan Joint Venture
Project:	Ft. Riley Building 216
Location:	Fort Riley, Kansas
Description:	4,782 sq. ft. of FIRM-FILL CMD

Contractor:	CBS Construction
Project:	Hutchinson Senior Care Center
Location:	Hutchinson, Minnesota
Description:	120,000 sq. ft. of FIRM-FILL CMD

Contractor:	Colson & Colson
Project:	Glendale Retirement Center
Location:	Glendale, California
Description:	41,580 sq. ft. of FIRM-FILL CMD

Contractor:	Mosley Construction
Project:	Candlewood Suites
Location:	New Bern, North Carolina
Description:	33,500 sq. ft. of FIRM-FILL CMD