

**Division 03 54 13:
Gypsum Cement Underlayment**



Hacker Industries, Inc.
Architect Binder



FIRM-FILL®

High Strength

FIRM-FILL®

HIGH STRENGTH

Technical Data	Properties	ASTM
Weight	7.7 lbs/ft ² (34.2 kg/m ²) at 3/4" (19mm)	C472 M
Thickness	Feather edge in transition areas to 3-1/2" (89mm)	
Compressive Strength	2500 - 3800 psi (17.2-26.2 MPa)	C472 M
Thermal Performance	K-value of 3.34 Btu; R-value of 0.30 ft ² .h.°F/Btu	C177
Fire Hazard Classification	Flamespread index 0; Fuel Contribution 0; Smoke Density 0	E84
Sand	1/8" (3mm) or less washed plaster, masonry sand or silica	E11



- Cost-effective way to correct damaged, uneven concrete subfloors
- Integral part of over 90 UL design listings
- Lightweight and crack-resistant
- Ideal for light commercial, renovation and repair projects
- Little shot-blasting or surface preparation required
- Helps contribute points to LEED® project certification
- Creates a flat, durable surface for finished floor coverings
- Installed only by Licensed Applicators across North America

Product Description

FIRM-FILL® High Strength is designed to repair and re-surface cracked, damaged and out-of-level concrete subfloors in renovation and repair projects. FIRM-FILL® High Strength sets in 90 minutes and is suitable for light foot traffic the following day. Installed from feather-edge to 3-1/2", FIRM-FILL® High Strength provides exceptional strength and durability. FIRM-FILL® High Strength provides compressive strengths from 2500 to 3800 psi (17.2 to 26.2 MPa).

FIRM-FILL® High Strength is mixed on the job site with local sand (per ASTM E-11) and water to create a lightweight slurry. At 3/4" (19mm) thick, the underlayment weighs approximately 7.7 lbs/ft² with a dry density range of 120-125 pcf.

For new construction or renovation, FIRM-FILL® High Strength provides a cost-efficient way to create a fire-resistant, sound-rated and smooth floor surface. FIRM-FILL® High Strength is suitable for a variety of finished floor coverings. For additional sound control, specify FIRM-FILL® High Strength with a Hacker Sound Control Mat.

Limitations

- 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.
- If installed above a crawl space, subfloor must be protected by a vapor barrier.
- No single application of FIRM-FILL® High Strength shall exceed 3-1/2" in depth.
- FIRM-FILL® High Strength 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® High Strength, the building must be enclosed and the temperature maintained at a minimum of 50°F (10°C). Prior to the installation of FIRM-FILL® High Strength, the subfloor shall be structurally sound (L/360) and broom clean, dry and free from oil, grease, paraffin, laitance, wax or other contaminants. Moisture Vapor Emission Rate (MVER) per ASTM F1869. After installation, temporary wood planking shall be placed by the GC wherever the floor underlayment will be subject to wheeled or concentrated loads. MVER of subfloor shall not exceed 3lbs./1000 ft² per 24 hours.

If required, prime concrete subfloors per recommended specifications before installing underlayment. Multiple coats may be required. Adequate ventilation shall be provided by the General Contractor (GC) to ensure proper drying of FIRM-FILL® High Strength. If necessary, the GC shall provide mechanical ventilation. Depending on thickness and drying conditions, the underlayment should dry within 8 to 12 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® High Strength 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. See ASTM F2419.

Product Data

Approximate Compressive Strength (aggregated) ASTM C472 (modified): 2500 to 3800 psi
(17.2 to 26.2 MPa)

Approximate Dry Density (aggregated): 120 to 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.

Compliance

- ICC-ES ECR-4147 • City of Los Angeles Research Report No. 24540 • ASTM F2419
- FHA - HUD MR 1255 Tile Council of America (F180, F200, RH111, RH122)

UL Designs

G565	G568	J917	J919	J920	J924	J927	J931	J957	J966	J991	J994
K906	L001	L004	L005	L006	L201	L202	L206	L208	L209	L210	L211
L212	L501	L502	L503	L504	L505	L506	L507	L508	L509	L510	L511
L512	L513	L514	L515	L516	L517	L518	L519	L520	L521	L522	L523
L524	L525	L526	L527	L528	L529	L530	L531	L532	L533	L534	L535
L536	L537	L538	L539	L540	L541	L542	L543	L544	L545	L546	L547
L548	L549	L550	L551	L552	L553	L555	L556	L557	L558	L559	L570
L574	L560	L562	L563	L571	L585	L590	L592	L593	L598	M502	M506
M508											

Ancillary Products

Hacker Floor Primer, Hacker TopCoat SP and Hacker Floor Sealer are available for use with FIRM-FILL® High Strength. Contact Hacker Industries, Inc. at (800) 642-3455 for additional 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.**

TRADEMARKS

FIRM-FILL, GYP-SPAN, Let Our Products FLOOR You and the associated logos are trademarks of Hacker Industries, Inc. LEED is a registered trademark of the U.S. Green Building Council.

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.

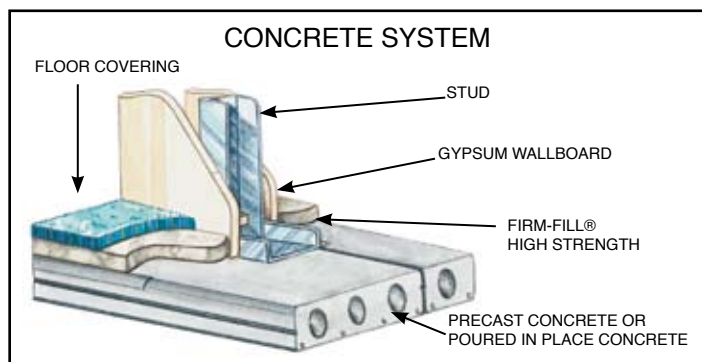
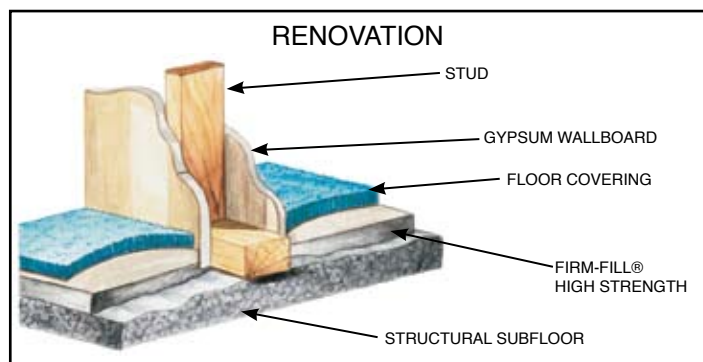
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*Whether it's leveling a small office or resurfacing an entire building, **FIRM-FILL® HIGH STRENGTH** is the cost-effective solution for correcting damaged, uneven or cracked concrete.*

*From feather-edge in transition areas to 3-1/2", **FIRM-FILL® HIGH STRENGTH** provides exceptional surface hardness with compressive strengths up to 3800 psi.*

- 89 UL Listings; ICC-ES Legacy Report
- Can be poured either before or after drywall
- Rapid and efficient installation; sets in 90 minutes
- Installed exclusively by Licensed Applicators nationwide
- Strong, crack-resistant surface for finished floor coverings



Recommended Specifications for FIRM-FILL® High Strength

PART I GENERAL

- 1.1 Scope – Specify to meet project requirements
 - A. Work included:
 1. **FIRM-FILL® HIGH STRENGTH**
 2. Division 3 Section - Gypsum Cement Underlayment
 3. Division 9 Section - Acoustical Treatment
- 1.2 Qualifications
 - A. **FIRM-FILL® HIGH STRENGTH** shall be installed by Licensed Applicators of Hacker Industries, Inc., using approved mixing and pumping equipment with a water meter.
 - B. **FIRM-FILL® HIGH STRENGTH** shall be delivered in original, unopened bags and protected from exposure to the elements. Product shall not be used beyond its shelf life.
 - C. Install before or after drywall, as specified.
 - D. Before, during, and after installation of **FIRM-FILL® HIGH STRENGTH** (until dry), the building interior shall be continuously ventilated and heated to a minimum of 50°F (10°C).
 - E. All materials, unless otherwise specified, shall be supplied by Hacker Industries, Inc.

PART II PRODUCTS

- 2.1 Materials
 - A. Gypsum Concrete: **FIRM-FILL® HIGH STRENGTH**; 2500 psi to 3800 psi (17.2 to 26.2 MPa).
- 2.2 Accessories
 - A. Sound Mat: Hacker Sound Mat II; **FIRM-FILL® SCM**; or as otherwise specified.
 - B. Hacker Floor Primer
 - C. Hacker Floor Sealer, if specified
 - D. Hacker TopCoat™ SP, if specified.
 - E. Sand Aggregate: 1/8" (3mm) or less washed plaster or masonry sand meeting requirements of Hacker Industries, Inc. Sand Guidelines.
 - F. Mix Water: Potable and free from impurities.

PART III EXECUTION

- 3.1 Condition of Subfloor
 - A. The General Contractor (GC) shall provide structurally sound (L/360) subfloor; broom cleaned, dry, and free of oil, grease, paraffin, wax, laitance or other contaminants. The concrete substrate shall be 28 days or older and must be tested for moisture in accordance with ASTM F710.
 - B. Before installation, the GC shall approve the condition of the subfloor and test for dryness.
- 3.2 Preparation of Subfloor
 - A. All cracks and voids shall be filled with a quick-setting compound or equal.
 - B. Prime the subfloor using Hacker Floor Primer. Priming requirements may vary according to subfloor. Multiple coats may be necessary.
- 3.3 Mixing Instructions
 - A. 5 to 7 gallons (23 to 27L) of water as specified per 80 lb. (36kg) bag of **FIRM-FILL® HIGH STRENGTH**. Do not over-water. Water amount will change with wetness of sand.
 - B. **FIRM-FILL® HIGH STRENGTH** 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® HIGH STRENGTH** varies with the type of floor system. **FIRM-FILL® HIGH STRENGTH** can be feather-edged in low traffic areas over all concrete substrates. The max. thickness of **FIRM-FILL® HIGH STRENGTH** shall be 3-1/2" (89mm) in one lift.
 - C. Protection: After installation, temporary wood planking shall be placed by the GC wherever the underlayment is subject to wheeled or concentrated loads.
 - D. Drying: The GC shall provide continuous

ventilation and adequate heat to rapidly remove moisture from the area until the underlayment is dry. If necessary, the GC shall provide mechanical ventilation. Do not install finished floor coverings until the **FIRM-FILL® HIGH STRENGTH** has been 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.

- E. **FIRM-FILL® HIGH STRENGTH** 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. The floor covering manufacturer's specifications and requirements supersede these recommendations.
- B. Floor Covering Procedures: Please see Hacker Industries, Inc.'s "Guidelines for Installing Finished Floor Coverings." The guideline is not a warranty and shall be used as a guideline only. See ASTM F2419.

3.6 Field Quality Control

- A. Slump Test: **FIRM-FILL® HIGH STRENGTH** shall be tested for slump as it is being installed using a 2" by 4" (51mm by 102mm) cylinder. The patty size shall be 7" (178mm) +/- 1/2" (13mm) in diameter.
- B. Field Samples: Testing of molded cube samples shall be in accordance with ASTM C472 modified using split brass molds. Prior to independent testing, consult Hacker Industries, Inc.

SUBJECT TO EXPRESS WARRANTY STATED ON HACKER INDUSTRIES, INC.'S WEBSITE.



1600 Newport Center Drive, Suite 275
 Newport Beach, CA 92660 USA
 (949) 729-3101 FAX: (949) 729-3108
 Toll Free: (800) 642-3455 FAX: (800) 906-8548
 e-mail: info@HackerIndustries.com
www.HackerIndustries.com

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



Product Contributes Points Toward LEED® Credits



FIRM-FILL® High Strength 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® High Strength 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 from 2500 to 3800 psi (17.2 to 26.2 MPa).
- E. Materials shall be delivered in their original, unopened packages, and protected from exposure to the elements before and 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 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® High Strength, as supplied by Hacker Industries, Inc.
- B. Subfloor Primer: Hacker Floor Primer or approved equal
- C. Sand: 1/8" (3mm) or less washed plaster, masonry sand or silica sand meeting requirements of Hacker Industries, Inc. Sand Guidelines.
- D. Water: Potable and free from impurities
- E. Hacker TopCoat™ SP (if required)

2.2 Mix Design: See section 3.3



FIRM-FILL® High Strength Recommended Specifications (Cont.)

PART III. PREPARATION

3.1 Condition of Subfloor

- A. Subfloor shall be structurally sound (minimum L/360 live or dead load), broom clean and free from oil, grease, paraffin, laitance or other contaminants before the arrival of Hacker Licensed Applicator. The concrete substrate shall be 28 days or older and must be tested for moisture in accordance with ASTM F710.
- B. Before installation, the GC shall inspect and approve the condition of the subfloor and test the existing subfloor for moisture.

3.2 Preparation of Subfloor

- A. Leak Prevention: All cracks and voids shall be filled with a quick-setting patching or taping compound or equal where leakage may occur.
- B. Prime concrete subfloors using Hacker Floor Primer based upon job conditions.
- C. Hacker Floor Primer is not always required over concrete substrates. Multiple coats may be required over porous concrete or plank. The Hacker Licensed Applicator can give specific recommendations. (Note: For rehabilitation work or pours over old concrete, consult a Licensed Applicator or Hacker Industries, Inc., for recommended preparation.)

3.3 Mixing Instructions

- A. 5 to 7 gallons (18.9 to 26.5L) of water and sand as specified per 80-pound (36.3kg) bag of FIRM-FILL® High Strength. Do not over-water. Water amount will change with wetness of sand.
- B. FIRM-FILL® High Strength mix proportions, mix designs and methods shall be in strict accordance with Hacker Industries, Inc.'s recommendations.

3.4 Underlayment Application

- A. Scheduling:
 - 1. Installation of FIRM-FILL® High Strength shall not begin until the building is enclosed, including roof, windows, doors and other openings.
 - 2. FIRM-FILL® High Strength shall be installed before or after the installation of drywall, as specified.
- B. Application:
 - 1. The minimum thickness of FIRM-FILL® High Strength varies with the type of concrete subfloor. FIRM-FILL® High Strength can be feather edged in low traffic areas over all concrete subfloors. The maximum thickness of FIRM-FILL® High Strength shall be 3-1/2" (89mm) in one lift.
 - 2. Install FIRM-FILL® High Strength by placing contents of bags, sand and water into the approved high-speed mixing device with a water meter and blend for a minimum of one minute. FIRM-FILL® High Strength shall be pumped onto floor areas, spreading and screeding to a smooth surface at specified thickness. Place



FIRM-FILL® High Strength Recommended Specifications (Cont.)

as continuously as possible until installation is complete so that no FIRM-FILL® High Strength slurry is placed against FIRM-FILL® High Strength that has obtained its initial set, except at authorized joints.

3. FIRM-FILL® High Strength is suitable for interior applications only and shall 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 and/or concentrated loads. The GC shall not place concentrated loads such as pallets of material, drywall, taping compounds or any heavy items, which may cause deflection, in the middle of the floor or in hallways.
- D. Drying: Before, during and after installation of FIRM-FILL® High Strength, building interior shall be ventilated and heated to a minimum of 50°F (10°C) to assure completion of the drying process. The GC must supply adequate ventilation and heat, if necessary, until the FIRM-FILL® High Strength is dry. If necessary, the GC shall provide mechanical ventilation. Do not install finished floor coverings until the FIRM-FILL® High Strength 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 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. See also ASTM F2419 for recommended procedures.

3.6 Field Quality Control

- A. Slump Test: FIRM-FILL® High Strength 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 7" (191mm) plus or minus 1/2" (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.



FIRM-FILL® High Strength Project References

Whether it's leveling a small office or resurfacing an entire building, FIRM-FILL® High Strength is the cost-effective solution for correcting damaged, uneven or cracked concrete in commercial projects. From feather-edge in transition areas to 3-1/2", FIRM-FILL® High Strength provides exceptional surface hardness with compressive strengths up to 3800 psi. Below is a small sample of the projects that have utilized FIRM-FILL® High Strength.

Contractor:	AA Boos & Sons
Project:	Fifth Third Field, Home of the Toledo Mudhens
Location:	Toledo, Ohio
Description:	35,000 sq. ft. of FIRM-FILL® High Strength
Contractor:	Ninteman (The Sundt Companies, Inc.)
Project:	Scripps Hospital
Location:	La Jolla, California
Description:	73,510 sq. ft. of FIRM-FILL® High Strength
Contractor:	Whiteco Construction
Project:	Marriott Hotel
Location:	Austin, Texas
Description:	79,000 sq. ft. of FIRM-FILL® High Strength
Contractor:	The White Company Inc.
Project:	Tenderfoot Employee Housing
Location:	Keystone, Colorado
Description:	52,000 sq. ft. of FIRM-FILL® High Strength
Contractor:	Carlstrom
Project:	Bethany Assisted Living
Location:	Minong, Wisconsin
Description:	6,992 sq. ft. of FIRM-FILL® High Strength
Contractor:	Austin Commercial
Project:	Southern Methodist University, Meadows Museum
Location:	Dallas, Texas
Description:	10,000 sq. ft. of FIRM-FILL® High Strength
Contractor:	Morcon
Project:	Grand Hotel
Location:	Minneapolis, Minnesota
Description:	19,069 sq. ft. of FIRM-FILL® High Strength