

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



**Hacker Industries, Inc.**  
**Architect Binder**



# **FIRM-FILL® 4010**



# FIRM-FILL® 4010

## FLOOR UNDERLAYMENT

Technical Data	Properties	ASTM
Weight	5.3 lbs/ft <sup>2</sup> at 1/2"	C472 M
Thickness	Feather edge in transition areas to 2" (50.8mm)	F2419
Compressive Strength	4000 - 5000 psi (27.5 - 34.4 MPa)	C472 M
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 sand	E11



- Designed for use over concrete slabs or pre-cast concrete
- Integral part of over 90 UL design listings
- Lightweight and crack-resistant
- Ideal for commercial, institutional and renovation projects
- Minimal 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® 4010 is a cementitious floor underlayment from Hacker Industries, Inc. designed for thin-capping concrete in new construction or renovation projects with little shot-blasting required. FIRM-FILL® 4010 sets in 90 minutes and is suitable for light foot traffic the following day. Installed from feather-edge to 2", FIRM-FILL® 4010 is widely used over existing concrete, precast, and damaged or cracked lightweight concrete to create a strong, flat surface for finished floor coverings. FIRM-FILL® 4010 provides compressive strengths from 4000 to 5000 psi (27.5 to 34.4 MPa).

FIRM-FILL® 4010 is mixed on the job site with local washed plaster, masonry or silica sand (per ASTM E-11) and water to create a lightweight slurry. At 1/2" thick, the underlayment weighs approximately 5.3 lbs/ft<sup>2</sup> with a dry density range of 125-130 pcf.

For new construction or renovation, FIRM-FILL® 4010 is a cost-effective way to maximize sound control and provide high fire ratings. FIRM-FILL® 4010 is a suitable surface for a variety of finished floor coverings.

### 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® 4010 shall exceed 2" in depth.
- FIRM-FILL® 4010 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® 4010, the building must be enclosed and the temperature maintained at a minimum of 50°F (10°C). Prior to the installation of FIRM-FILL® 4010, the subfloor shall be structurally sound (L/360) and broom clean, dry and free from oil, grease, paraffin, laitance, wax or other contaminants. Concrete subfloors shall be 28 days or older. For on-grade applications over concrete, measure the 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 shall not exceed 3lbs./1000 sq. ft. per 24 hours. MVER shall not exceed 3lbs./1000 sq. ft. 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® 4010. If necessary, the GC shall provide mechanical ventilation. Depending on thickness and drying conditions, the underlayment shall dry within 7 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® 4010 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):** 4000 to 5000 psi  
(27.5 to 34.4 MPa)

**Approximate Dry Density (aggregated):** 127 to 130 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 ER-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® 4010. 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.**

**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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**Hacker Industries, Inc.**

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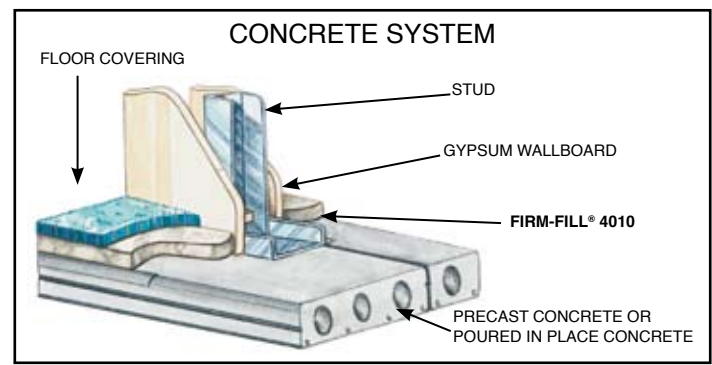
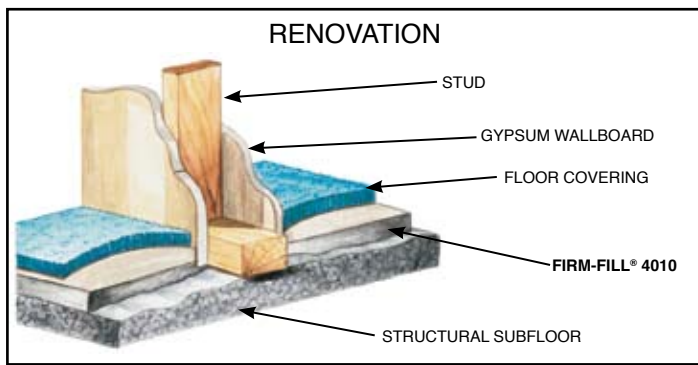
# **Firm-Fill® 4010**

**FIRM-FILL® 4010**, a cementitious floor underlayment from Hacker Industries, Inc., is designed for thin-capping concrete in new construction and renovation projects with no shot-blasting required.

Installed from feather-edge to 2", fast-drying **FIRM-FILL® 4010** is poured over existing concrete or damaged, cracked concrete to provide a strong, flat surface for finished floor coverings.

- Meets and exceeds ASTM F2419 and ASTM F710
- Smooth, rock-solid surface for finished floor coverings
- Compressive strengths up to 5000 psi; no shrinkage cracks
- Fast drying underlayment; superior bonding characteristics
- TCNA Methods; 89 UL Listings; ICC-ES Legacy Report
- Rapid installation; up to 40,000 sq. ft. per day
- Installed by trained, Licensed Applicators





## Recommended Specifications for FIRM-FILL® 4010

### PART I GENERAL

- 1.1 Scope – Specify to meet project requirements
  - A. Work included:
    1. **FIRM-FILL® 4010**
    2. Division 3 Section - Gypsum Cement Underlayment
    3. Division 9 Section - Acoustical Treatment
- 1.2 Qualifications
  - A. **FIRM-FILL® 4010** shall be installed by Licensed Applicators of Hacker Industries, Inc., using approved mixing and pumping equipment with a water meter.
  - B. **FIRM-FILL® 4010** shall be delivered in original, unopened bags and protected from exposure to the elements. Product shall not be used beyond shelf life.
  - C. Install before or after drywall, as specified.
  - D. Before, during, and after (until dry) installation of **FIRM-FILL® 4010**, the building interior shall be continuously ventilated and heated to a min. 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® 4010** 4000 to 5000 psi (27.5 to 34.4 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 a 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. Consult floor covering manufacturer for the maximum allowable Moisture Vapor Emission Rate and retained moisture content in substrate for dryness test.

- B. Before installation, the GC shall approve the condition of the subfloor and test the existing subfloor for moisture.
- 3.2 Preparation of Subfloor
  - A. All cracks and voids shall be filled with a quick-setting compound or equal.
  - B. If required, prime the subfloor using Hacker Floor Primer. Multiple coats may be necessary. Priming requirements vary according to the subfloor.
- 3.3 Mixing Instructions
  - A. 4 to 6 gallons (15 to 23L) of water as specified per 80 lb. (36kg) bag of **FIRM-FILL® 4010**. Do not overwater. Water amount will change depending upon wetness of sand.
  - B. **FIRM-FILL® 4010** 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® 4010** varies with the type of floor system. **FIRM-FILL® 4010** can be feather-edged in low traffic areas over all concrete subfloors. The maximum thickness of **FIRM-FILL® 4010** shall be 2" (38mm) in one lift.
  - C. Protection: After installation, temporary wood planking shall be placed by 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, GC shall provide mechanical ventilation. Do not

install finished floor coverings until the **FIRM-FILL® 4010** 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.

- E. **FIRM-FILL® 4010** is suitable only for interior applications 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 manufacturers' specifications and requirements supercede 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® 4010** 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.*



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



# **FIRM-FILL® 4010 Recommended Specifications**

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## **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® 4010 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 4000 to 5000 psi (27.5 to 34.4 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® 4010, 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
- 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**



## **FIRM-FILL® 4010 Recommended Specifications (Cont.)**

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- 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. The concrete substrate must be 28 days or older. Consult floor covering manufacturer for the maximum allowable Moisture Vapor Emission Rate and retained moisture content in substrate for dryness test.
- B. Leak Prevention: All cracks and voids shall be filled with a quick-setting patching or taping compound or equal where leakage may occur.
- C. Before installation, the GC shall inspect and approve the condition of the subfloor and test the existing subfloor for moisture.

### **3.2 Priming**

- 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. 4 to 6 gallons (15.1 to 22.7L) of water and sand as specified per 80 pound (36.3kg) bag of FIRM-FILL® 4010. Do not overwater. Water amount will change with the wetness of sand.
- B. FIRM-FILL® 4010 mix proportions and methods shall be in strict accordance with Hacker recommendations.

### **3.4 Underlayment Application**

- A. Scheduling:
  - 1. Installation of FIRM-FILL® 4010 shall not begin until the building is enclosed, including roof, windows, doors and other openings.
  - 2. FIRM-FILL® 4010 can be installed before or after the installation of drywall, as specified.
- B. Application:
  - 1. The minimum thickness of FIRM-FILL® 4010 varies with the type of concrete subfloor. FIRM-FILL® 4010 can be feather edged in transition areas over all concrete subfloors. The maximum thickness of FIRM-FILL® 4010 shall be 2" (51mm) in one lift.





## **FIRM-FILL® 4010 Recommended Specifications (Cont.)**

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2. Install FIRM-FILL® 4010 by placing contents of bags, sand and water into the approved high-speed mixing device and blend for a minimum of one minute. FIRM-FILL® 4010 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® 4010 slurry is placed against FIRM-FILL® 4010 that has obtained its initial set, except at authorized joints.
  3. FIRM-FILL® 4010 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 material, which may cause deflection, in the middle of the floor or in hallways.
- D. Drying: Before, during and after installation of FIRM-FILL® 4010, building interior shall be ventilated and heated to a minimum 50°F (10°) to assure completion of the drying process. The GC must supply mechanical ventilation and heat, if necessary. Do not install finished floor coverings until the FIRM-FILL® 4010 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 document 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® 4010 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" (178mm) plus or minus 1/2" (13mm) in diameter.
- B. Field Samples: Testing shall be done in accordance with ASTM C472 Modified testing procedure 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® 4010 Project References

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FIRM-FILL® 4010 is a cementitious floor underlayment from Hacker Industries, Inc. designed for thin-capping concrete in new construction or renovation projects with no shot-blasting required. Installed from feather-edge to 2", fast-drying FIRM-FILL® 4010 poured over existing concrete, precast, and damaged or cracked light-weight concrete provides a strong, flat surface for finished floor coverings. Below is a small sample of projects that have utilized FIRM-FILL® 4010.

Contractor: Devcon Construction  
Project: Hampton Inn - Bodo  
Location: Boise, Idaho  
Description: 14,700 sq. ft. of FIRM-FILL® 4010

Contractor: Dave's Construction  
Project: Belk @ Cool Springs  
Location: Brentwood, Tennessee  
Description: 5,400 sq. ft. of FIRM-FILL® 4010

Contractor: MKB Contractors  
Project: Scott AFB - Hangar #1, Building 433  
Location: Belleville, Illinois  
Description: 33,252 sq. ft. FIRM-FILL 4010

Contractor: Hand Construction, Inc.  
Project: Timbers of Terrell (Bldg. #1)  
Location: Terrell, Texas  
Description: 10,000 sq. ft. of FIRM-FILL® 4010

Contractor: PCL Constructors Canada Inc.  
Project: Canada-US Border Crossing Facility-Travelers Building  
Location: Emerson, Manitoba, Canada  
Description: 10,258 sq. ft. of FIRM-FILL® 4010

Contractor: Prime Contractors, Inc.  
Project: Jefferson Street Jail  
Location: Atlanta, Georgia  
Description: 16,961 sq. ft. of FIRM-FILL® 4010

Contractor: Joseph A. Natoli Construction Corporation  
Project: Franciscan Oaks, Fairlawn Building  
Location: Denville, New Jersey  
Description: 79,600 sq. ft. of FIRM-FILL® 4010