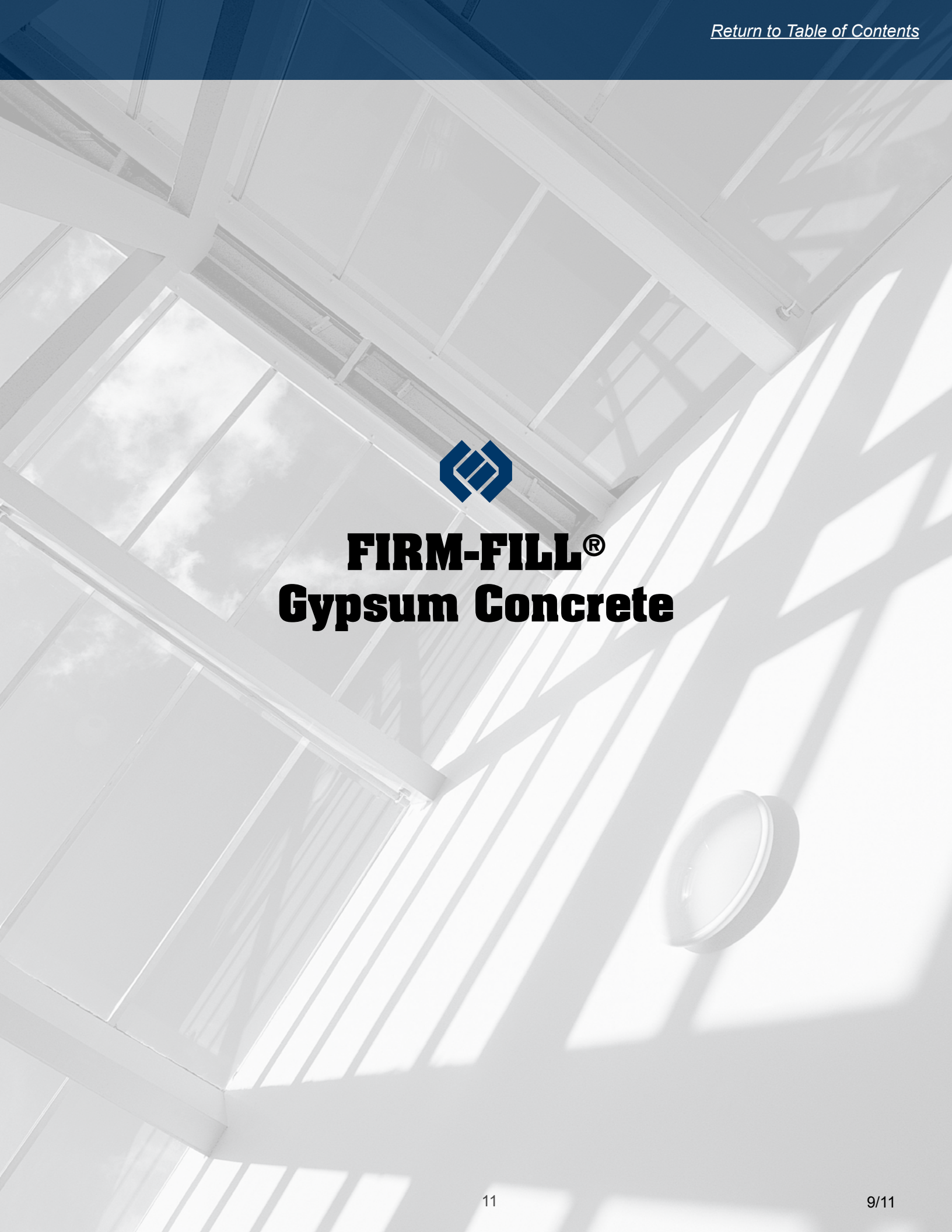
Division 03 54 13:
Gypsum Cement Underlayment

Hacker Industries, Inc.

Architect Binder



FIRM-FILL®
Gypsum Concrete

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Hacker Industries, Inc.

SUBMITTAL FORM

FIRM-FILL®

Gypsum Concrete

Technical Data	Properties	ASTM
Weight	7 lbs/ft² (34.2 kg/m²) at 3/4” (19mm)	C472 M
Thickness	3/4” (19mm) (minimum over wood) to 3 1/2” (89mm)	F2419
Compressive Strength	1200 - 2000 psi (8.3-13.8 MPa)	C472 M
Thermal Performance	K-value of 2.45 Btu; R-value of 0.41 ft².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 or masonry sand	E11

- Ideal over wood-frame and concrete in multi-family construction
- Essential for excellent STC and IIC ratings
- Install over a resilient sound mat for additional sound isolation
- Integral part of over 90 UL design listings
- Lightweight and crack-resistant
- Fast installation and rapid set time; can be walked on in 90 minutes
- 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® Gypsum Concrete, the original blue bag underlayment, from Hacker Industries, Inc. is formulated for use over wood or concrete subfloors in multi-family construction. FIRM-FILL® Gypsum Concrete provides compressive strengths from 1200 - 2000 psi (8.3 - 13.8 MPa). Depending on compressive strength, it can be installed before or after drywall. To keep project on schedule and on budget, Hacker Industries, Inc.’s Licensed Applicators can install over 40,000 ft² of FIRM-FILL® Gypsum Concrete in one day.

FIRM-FILL® Gypsum Concrete is mixed on the job site with local sand (per ASTM E11) and water to create a lightweight slurry. Installed at a minimum of 3/4” thick over wood, the underlayment weighs approximately 7 lbs/ft².

For new construction or renovation, FIRM-FILL® Gypsum Concrete is a cost-efficient way to create a smooth, hard surface for finished floor coverings while offering exceptional compressive strengths matched with superior acoustical control and fire resistance properties. To achieve additional sound isolation, use FIRM-FILL® Gypsum Concrete with a Hacker Industries, Inc. 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® Gypsum Concrete shall exceed 3 1/2” in depth.
- FIRM-FILL® Gypsum Concrete 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® Gypsum Concrete, the building must be en closed and the temperature maintained at a minimum of 50°F (10°C). Prior to the installation of FIRM-FILL® Gypsum Concrete, 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. MVER shall not exceed 3lbs./1000 ft^2 per 24 hours. Prime wood sub floors per recommended specifications before installing underlayment. Adequate ventilation shall be provided by the General Contractor (GC) to ensure proper drying of FIRM-FILL® Gypsum Concrete. If necessary, the GC shall provide mechanical ventilation and heat. Depending on thickness and drying conditions, the underlayment will dry within 10 to 14 days. After installation, temporary wood planking shall be placed by the GC wherever the floor underlayment will be subject to wheeled or concentrated loads. 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® Gypsum Concrete 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): 1200 to 2000 psi (8.3 to 13.8 MPa)

Approximate Dry Density (aggregated): 107 to 115 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											

Related Products

Hacker Floor Primer, Hacker TopCoat™ SP and Hacker Floor Sealer are available for use with FIRM-FILL® Gypsum Concrete 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®
Gypsum Concrete

Firm-Fill® Gypsum Concrete,
the original "blue bag" underlayment introduced by Hacker Industries, Inc. in 1983, is designed to achieve ultimate sound and fire resistance in multi-family housing.

Offering exceptional compressive strengths (up to 2000 psi), it is the versatile solution for a crack-resistant, flat, and durable surface ready for finished floor coverings.

- **Flattens subfloors**
- **Crack-resistant**
- **Lightweight; high-strength**
- **Superior STC and IIC ratings**
- **Over 89 UL Design Listings**
- **Code approval from ICC-ES**
- **Meets and exceeds ASTM F2419**
- **Trained, Licensed Applicators**

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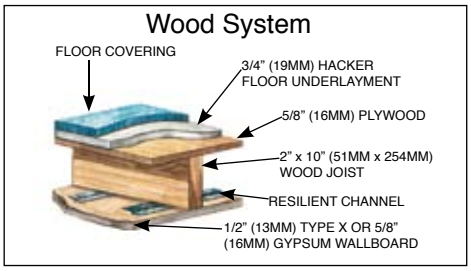

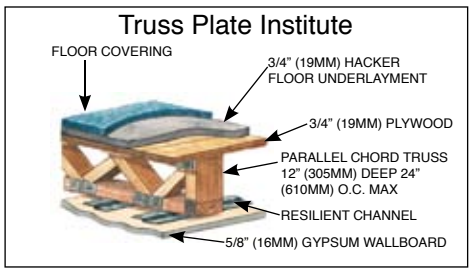

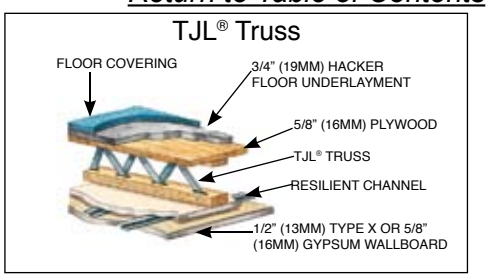

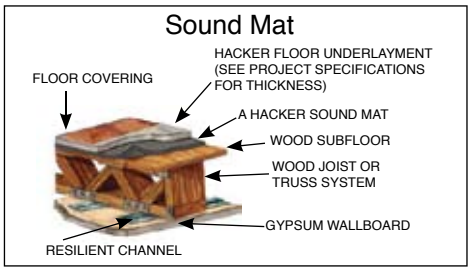

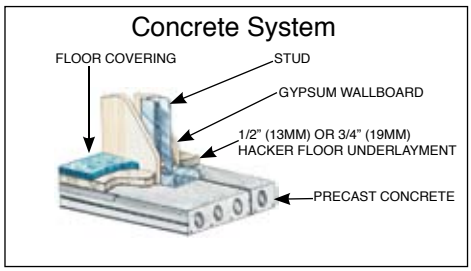

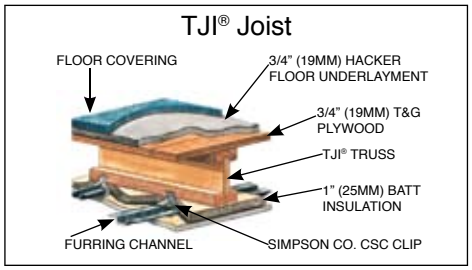

These drawings shall not be used without a complete evaluation by the owner's design professional to verify the suitability of its use with the project's specific application.

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Recommended Specifications for FIRM-FILL® Gypsum Concrete

PART I GENERAL

1.1 Scope – Specify to meet project requirements
- A. Work included:
  1. **Firm-Fill® Gypsum Concrete**
  2. Division 3 Section - Gypsum Cement Underlayment
  3. Division 9 Section - Acoustical Treatment

1.2 Qualifications
- A. **Firm-Fill® Gypsum Concrete** shall be installed by Licensed Applicators of Hacker Industries, Inc., using approved mixing and pumping equipment with a water meter.
- B. **Firm-Fill® Gypsum Concrete** 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.
- D. Before, during, and after installation of **Firm-Fill® Gypsum Concrete** (until dry), 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® Gypsum Concrete;** 1200 to 2000 psi (8.3 to 13.8 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) is responsible for providing a structurally sound (L/360) subfloor, broom cleaned, dry, and completely free of oil, grease, paraffin, wax, laitance or other contaminants.
- B. Before installation, the GC shall inspect and approve the condition of the subfloor and test the existing subfloor for dryness.

3.2 Preparation of Subfloor
- A. All cracks and voids shall be filled with a quick-setting compound or equal.
- B. Plywood/OSB: Spray one coat Hacker Floor Primer using one diluted gallon (3.8L) per 500 square feet (47m^2).
- C. Other substrata: Conditions may vary. Consult Hacker Industries, Inc. for recommended preparation.

3.3 Mixing Instructions
- A. 6 to 7 gallons (23 to 27L) of water as specified per 80 lb. (36kg) bag of **Firm-Fill® Gypsum Concrete.** Do not over water. Water amount will change depending upon wetness of sand.
- B. **Firm-Fill® Gypsum Concrete** mix proportions and methods shall be in strict accordance with Hacker recommendations.

3.4 Underlayment Application
- A. Application: **Firm-Fill® Gypsum Concrete** shall be installed at 3/4" (19mm) minimum over wood frame, 1/2" (13mm) minimum over precast or poured in place concrete. Contact Hacker Industries, Inc. for recommended thickness over sound control mats. Place continuously until installation is complete.
- B. Protection: After installation, temporary wood planking shall be placed by GC wherever the underlayment is subject to wheeled or concentrated loads.
- C. 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 and heat. Do not install finished floor coverings until the **Firm-Fill® Gypsum Concrete** has been tested for dryness. Consult flooring contractor for recommended procedures to test for dryness and acceptable moisture levels. 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.
- D. **Firm-Fill® Gypsum Concrete** 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 manufacturers' specifications and requirements supercede these recommendations.
- B. Floor Covering Procedures: 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® Gypsum Concrete** shall be tested as it is being installed using a 2" by 4" (51mm by102mm) cylinder. The patty size shall be 8" (203mm) +/- 1/2" (13mm).
- 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.

Product Helps Contribute Points Toward LEED® Credits

FIRM-FILL® Gypsum Concrete 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® Gypsum Concrete 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 1200 to 2000 psi (8.3 to 13.8 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 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® Gypsum Concrete, as supplied by Hacker Industries, Inc.

B. Subfloor Primer: Hacker Floor Primer or approved equal

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

D. Water: Potable and free from impurities

E. Hacker TopCoat™ SP (if specified)

2.2 Mix Designs: 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.

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 wood subfloors with one coat of Hacker Floor Primer (diluted 1:4 with water) using one gallon (3.78L) per 500 sq. ft. (47m^2).

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 and/or porous concrete, consult a Licensed Applicator or Hacker Industries, Inc., for recommended preparation.)

3.3 Mixing Instructions

A. 6 to 7 gallons (22.7 to 26.5L) of water and sand as specified per 80 pound (36.3kg) bag of FIRM-FILL® Gypsum Concrete. Do not over-water. Water amount will change with wetness of sand.

B. FIRM-FILL® Gypsum Concrete 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® Gypsum Concrete shall not begin until the building is enclosed, including roof, windows, doors and other openings.

2. FIRM-FILL® Gypsum Concrete shall be installed before or after the installation of drywall.

B. Application:

1. The minimum thickness of FIRM-FILL® Gypsum Concrete varies with the type of subfloor. Over wood subfloors, a minimum of 3/4" (19mm) is required. Over precast or poured in place concrete, a minimum of 1/2" (13mm) is required.

2. Install FIRM-FILL® Gypsum Concrete 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® Gypsum Concrete should 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® Gypsum Concrete slurry is placed against FIRM-FILL® Gypsum Concrete that has obtained its initial set, except at authorized joints.

3. FIRM-FILL® Gypsum Concrete 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 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® Gypsum Concrete, building interior shall be ventilated and heated to a minimum of 50°F (10°C) to assure completion of the drying process. The GC shall provide continuous ventilation and heat and adequate heat to rapidly remove moisture from the area until the FIRM-FILL® Gypsum Concrete is dry. If necessary, the GC shall provide mechanical ventilation. Do not install finished floor coverings until the FIRM-FILL® Gypsum Concrete 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.

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 guidelines are 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® Gypsum Concrete 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 on an approved plexiglass surface using a 2" by 4" (51mm by 102mm) cylinder. The acceptable patty size shall be 8 1/2" (215.9mm) 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® Gypsum Concrete
Project References

FIRM-FILL® Gypsum Concrete, the original blue bag underlayment, introduced by Hacker Industries, Inc. in 1983, is designed to achieve the ultimate sound and fire resistance in multi-family housing. With over 90 UL listings and exceptional STC and IIC ratings, FIRM-FILL® Gypsum Concrete is an excellent choice for jobs needing compressive strengths up to 2000 psi. Below is a small sample of projects that have utilized FIRM-FILL® Gypsum Concrete.

Contractor:	Adolfson & Peterson
Project:	Campus Suites on the Rail, Coyote Landing
Location:	Phoenix, Arizona / Tempe, Arizona
Description:	Various projects with FIRM-FILL® Gypsum Concrete
Contractor:	Gables Residential
Project:	Century Center
Location:	Atlanta, Georgia
Description:	269,000 sq. ft. of FIRM-FILL® Gypsum Concrete
Contractor:	Fairfield Development
Project:	Indigo Creek
Location:	Thornton, Colorado
Description:	140,040 sq. ft. of FIRM-FILL® Gypsum Concrete
Contractor:	Wood Partners
Project:	Vantage @ Converse
Location:	Converse, Texas
Description:	127,980 sq. ft. of FIRM-FILL® Gypsum Concrete
Contractor:	Amli
Project:	Quadrangle
Location:	Dallas, Texas
Description:	148,365 sq. ft. of FIRM-FILL® Gypsum Concrete
Contractor:	A G Spanos
Project:	Delayne @ Twin Creek
Location:	Allen, Texas
Description:	139,220 sq. ft. of FIRM-FILL® Gypsum Concrete
Contractor:	Connery Building Corporation
Project:	Harbor House U.S. Housing & Urban Development (HUD) Apartments
Location:	Madison, Wisconsin
Description:	200,000 sq. ft. of FIRM-FILL® Gypsum Concrete