Hacker Industries, Inc.

1. Product Name

Hacker Floor Underlayments
- FIRM-FILL® Gypsum Concrete
- FIRM-FILL® 2010
- FIRM-FILL® 3310
- FIRM-FILL® High Strength
- FIRM-FILL® 4010
- GYP-SPAN® Radiant
- Hacker Sound Mat II
- Hacker TopCoat™ SP
- Hacker Floor Primer

2. Manufacturer

Hacker Industries, Inc.
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3. Product Description

BASIC USE

Hacker Floor Underlayments (HFU) are lightweight, high strength, durable, nonstructural cementitious underlayments for use in residential, multifamily, commercial and radiant heating projects for both new construction and renovation. Trained Licensed Applicators can install 500 - 40,000 ft² (46 - 3716 m²) per day. The finished products provide a crack-resistant surface that is sound rated and fire resistant.

Hacker Industries, Inc., has provided cost-effective underlayments since 1983. With the proven performance of over a billion and one-half square feet installed nationwide, HFU are appropriate for use over concrete or wood substrates. With proper preparation, virtually any type of flooring material can be installed over HFU. All HFU meet ASTM F2419 (see Technical Data).

COMPOSITION & MATERIALS

FIRM-FILL® Gypsum Concretes and GYP-SPAN® Radiant are mixed with washed masonry sand and potable water to form HFU.

TYPES
- FIRM-FILL® Gypsum Concrete - Designed for use in multifamily housing for sound and fire ratings. Nominal average compressive strength (ASTM C472) is 1200 - 2000 psi (8.3 - 13.8 MPa). 3/4" (19.1 mm) thickness weighs 7 psf (34.2 kg/m²)
- FIRM-FILL® 2010 - Offers additional surface hardness and higher compressive strengths. Nominal average compressive strength (ASTM C472) is 1600 - 2500 psi (11 - 17.2 MPa). 3/4" (19.1 mm) thickness weighs 7.2 psf (35.2 kg/m²)
- FIRM-FILL® 3310 - Provides an exceptionally smooth, rock-hard surface over wood subfloors in residential and commercial construction. Nominal average compressive strength (ASTM C472) is 2000 - 3300 psi (13.8 - 22.8 MPa). 3/4" (19.1 mm) thickness weighs 7.6 psf (37.1 kg/m²)
- FIRM-FILL® High Strength - For leveling or resurfacing concrete floors and planks. Nominal average compressive strength (ASTM C472) is 2500 - 3800 psi (17.2 - 26.2 MPa). 3/4" (19.1 mm) thickness weighs 7 psf (34.2 kg/m²)
- FIRM-FILL® 4010 - Offers superior bonding capabilities for thin capping of concrete floors. Nominal average compressive strength (ASTM C472) is 3500 - 5500 psi (24.1 - 37.9 MPa)
- GYP-SPAN® Radiant - Designed for use in radiant floors in conjunction with heating cables or hydronic systems; enhanced thermal mass and heat transfer. Nominal average compressive strength (ASTM C472) is 2000 - 3200 psi (13.8 - 22.1 MPa). 1 1/2" (38.1 mm) thickness weighs 14.6 psf (71.3 kg/m²)
- Hacker Sound Mat II - Sound abatement mat composed of 100% recycled rubber; dramatically increases both STC and IIC ratings
- Hacker Floor Primer - Subfloor primer and bonding agent
- Hacker TopCoat™ SP - Preparation agent to receive resilient floor coverings

APPLICATION THICKNESS

Minimum application thickness is:
- Over wood - 3/4" (19.1 mm) of HFU
- Over concrete slabs - HFU may be feather-edged for transitions
- Over radiant heat tubes - Minimum 3/4" (19.1 mm) on top of radiant tubes
- Over Hacker Sound Mat II - Minimum 1" (25.4 mm) of HFU
- Maximum thickness - 3 1/2" (89 mm)

LIMITATIONS
- Do not use HFU in exterior locations or in industrial applications such as warehouses
- Gypsum based systems must not be used below grade or where prolonged exposure to moisture is likely to occur
- Subfloor must be structurally sound and withstand loads with a deflection limit of L/360
- HFU above crawl spaces must be protected by a vapor barrier
- Do not apply less than 1 1/2" (38.1 mm) of HFU directly on plastic vapor barrier
- HFU require a finished floor covering
- A crack-suppression or waterproofing membrane is recommended under ceramic tile
- HFU are but one component of an effective sound and fire control system. Care must be taken in the installation of all construction components to ensure 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

4. Technical Data

APPLICABLE STANDARDS

ASTM International
- ASTM C33 Standard Specification for Concrete Aggregates
- ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)

- ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
- ASTM C472 Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete
- ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
- ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- ASTM E413 Classification for Rating Sound Insulation
- ASTM F2419 Standard Practice for Installation of Thick Poured Gypsum Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring

Tile Council of North America, Inc. - 2005 - 2006 Tile Council of North America Handbook - See Installation Methods (F180, F200, RH111 and RH122) for Poured Gypsum Underlayments

APPROVALS

- ICC-ES Legacy Report ER-4147
- City of Los Angeles RR No. 24540
- Metropolitan Dade County, Florida #96-0516.03
- U.S. Department of Housing and Urban Development FHA-HUD-1255

DENSITY

105 - 130 pcf (1682 - 2083 kg/m^3) minimum dry density

Fire Performance

HFU are included in more than 83 Underwriters Laboratories design listings, including:

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, L560, L562, L563 L571.

Consult the UL Fire Resistance Directory for illustrations of designs and fire resistance ratings.

FIRE HAZARD CLASSIFICATION

ASTM E84 - Flamespread index, 0; fuel contribution, 0; smoke density, 0

THERMAL PERFORMANCE

ASTM C177

- FIRM-FILL® Gypsum Concrete - k-value of 2.45 Btu/(ft^2 x h x °F) (4.2 W/(m x K)); R-value of 0.41 ft^2 x h x °F/Btu (0.07 m^2 x K/W)
- FIRM-FILL® 2010 - k-value of 2.8 Btu/(ft^2 x h x °F) (4.8 W/(m x K)); R-value of 0.36 ft^2 x h x °F/Btu (0.06 m^2 x K/W)
- FIRM-FILL® 3310 - k-value of 2.8 Btu/(ft^2 x h x °F) (4.8 W/(m x K)); R-value of 0.36 ft^2 x h x °F/Btu (0.06 m^2 x K/W)
- FIRM-FILL® High Strength - k-value of 3.34 Btu/(ft^2 x h x °F) (5.8 W/(m x K)); R-value 0.30 ft^2 x h x °F/Btu (0.05 m^2 x K/W)
- GYP-SPAN® Radiant - k-value of 4.35 Btu/(ft^2 x h x °F) (7.5 W/(m x K)); R-value of 0.23 ft^2 x h x °F/Btu (0.04 m^2 x K/W)

ACOUSTICAL PERFORMANCE

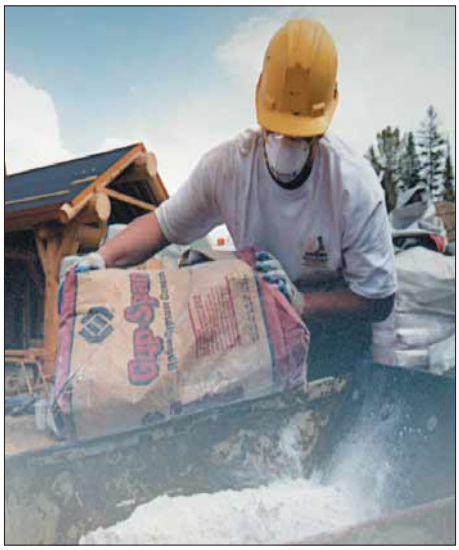
HFU produce superior Sound Transmission Class (STC) and Impact Isolation Class (IIC) ratings. Additional sound reduction is achieved using HFU in conjunction with Hacker Sound Mat II.

5. Installation

SITE CONDITIONS

Deliver materials to the jobsite in the manufacturer's original, unopened bags with labels intact. Protect materials from prolonged exposure to harmful environmental conditions and at a minimum temperature of 50 degrees F (10 degrees C). Do not allow bags to get wet. Remove damaged bags from the jobsite.

Building temperature must remain above 50 degrees F (10 degrees C) before, during and after installation and until the subfloor and ambient temperature and humidity have stabilized. Maintain temperature until material has completely cured.



PREPARATION

Confirm the subfloor is structurally sound and conditions are suitable for installation of floor underlayment. Subfloor must be broom cleaned, dry and free of oil, grease and other contaminants. Fill cracks and voids with a quick-setting taping compound to prevent leakage. In new construction, prime wood subfloors with one coat of Hacker Floor Primer. Consult a Licensed Applicator to determine requirements for sealing concrete substrates and procedures for renovation projects.

MIXING

Mix an 80 lb (36.3 kg) bag of HFU with 1.9 ft^3 (0.054 m^3) (or as otherwise specified) of 1/8" (3.2 mm) or less washed masonry or plaster sand and an approved amount of clean potable water in an approved high-speed mixing device.

APPLICATION

Prior to installation of HFU, the building must be enclosed, including roof, windows and doors. Floor underlayment may be installed before drywall according to Hacker Industries, Inc.'s guidelines.

Install HFU after radiant heat tubing has been affixed to the subfloor. HFU must be installed after Hacker Sound Mat II has been put in place.

Pump HFU slurry onto floor areas at 3/4" (19.1 mm) thickness (or as otherwise specified), and spread to a smooth surface. For radiant heating applications, a minimum 3/4"

(19.1 mm) of underlayment must be applied above the radiant tubes or cables. Pump product continuously to avoid pouring over material that has already set. The General Contractor must provide continuous ventilation and adequate heat to rapidly remove moisture from the area until the underlayment is completely dry.

FIELD TESTS

Perform field tests in strict accordance with ASTM C472 Modified, using 2" (51 mm) split brass molds. Consult Hacker Industries, Inc., prior to testing to ensure that proper procedures are followed.

Slump Tests

HFU should be tested for slump as they are being installed using a 2" x 4" (51 x 102 mm) cylinder. The patty size should be as specified by Hacker Industries, Inc.'s most current literature.

Dryness Tests

Prior to the installation of finished floor goods, Hacker Industries, Inc., recommends that a moisture test be performed. Recommendations for methods of testing moisture shall be provided by the floor covering manufacturer or the general contractor. Moisture testing can also be completed using an electronic moisture meter with a gypsum scale approved by Hacker Industries, Inc. Calcium chloride is not an approved method for testing the moisture level of gypsum floors.

PROTECTION

During construction, the General Contractor shall place temporary wood planking in areas subject to wheeled traffic or concentrated loads.

6. Availability & Cost

HFU are installed exclusively by trained Licensed Applicators. Contact Hacker Industries, Inc., for a local applicator.

7. Warranty

The supplier offers a limited warranty that the material is free from manufacturing defects and, when properly prepared and installed under recommended conditions, will attain the minimum physical specifications listed herein.

Hacker Industries, Inc.'s obligation shall be limited to the replacements of the bagged product only and is subject to notice and inspection requirements. This warranty is in lieu of all other warranties expressed or implied, including the warranties of merchantability and fitness for a particular purpose and all other obligations or liabilities. Contact Hacker Industries, Inc., for a full warranty statement.

8. Maintenance

No maintenance required under normal conditions.

9. Technical Services

For design and technical support, contact Hacker Industries, Inc., at (800) 642-3455.

10. Filing Systems

- Reed First Source®
- Sweet's Catalog Files
- 4SPECS.COM
- www.HackerIndustries.com
- Additional product information, specifications and specs on disk are available from Hacker Industries, Inc.

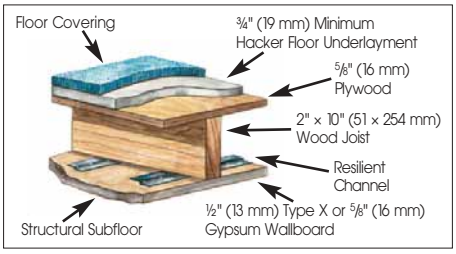


Figure 1: Wood System

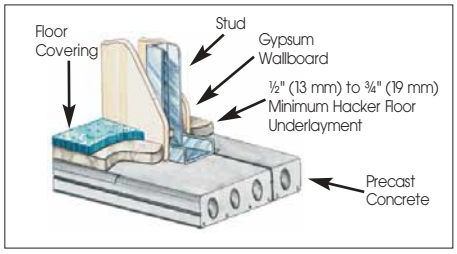


Figure 2: Concrete System

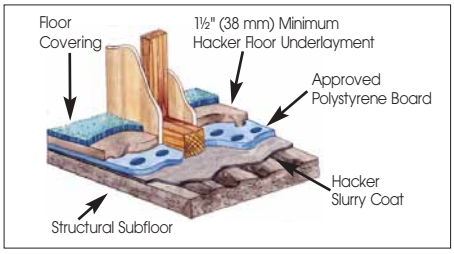


Figure 3: Polystyrene System

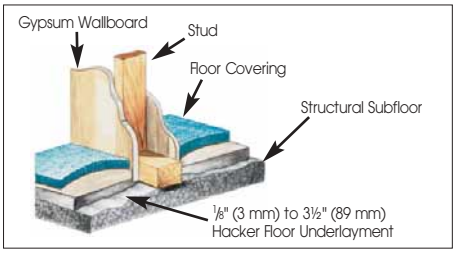


Figure 4: Renovation

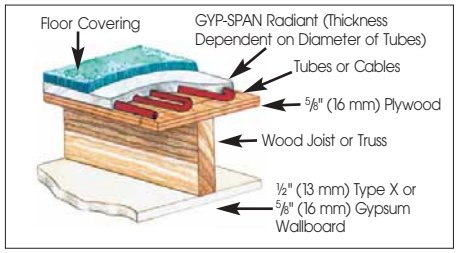


Figure 5: Radiant System

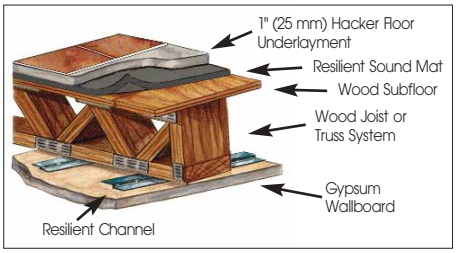


Figure 6: Sound Mat