Designation: F2471 – 13

Standard Practice for Installation of Thick Poured Lightweight Cellular Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring[1]

This standard is issued under the fixed designation F2471; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the installation and preparation of the thick poured lightweight cellular concrete underlayments over wood structural panel subfloors in commercial structures or over concrete floors in commercial structures and the preparation of the thick poured lightweight cellular concrete underlayment surface prior to the installation of resilient flooring in commercial buildings.

1.2 This practice points out the factors that are required to be controlled while installing thick poured lightweight cellular concrete underlayment as a base for resilient flooring.

1.3 This practice does not cover the structural adequacy of the wood structural panel subfloor or concrete subfloor. The structural integrity of assemblies is governed by local building codes.

1.4 This practice does not supercede the thick poured lightweight cellular concrete underlayment manufacturers', adhesive manufacturers' or resilient flooring manufacturers' written instructions. Consult the individual manufacturer for specific recommendations.

1.5 Thick poured lightweight cellular concrete underlayments are not suitable for use on concrete slabs on ground due to potential moisture problems arising from moisture intrusion, unless an adequate vapor retarder or vapor barrier is present directly beneath the concrete subfloor.

1.6 The values stated in inch-pound units are to be regarded as standard. The values stated in parentheses are mathematical conversions to SI Units, which are provided for information only.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C330 Specification for Lightweight Aggregates for Structural Concrete

F141 Terminology Relating to Resilient Floor Coverings

F710 Practice for Preparing Concrete Floors to Receive Resilient Flooring

F2170 Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

F1482 Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring

F2678 Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring

3. Terminology

3.1 Definitions used in this practice shall be in accordance with Terminology F141.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *fully adhered flooring, n*—resilient flooring which has adhesive under the entire product, bonding it to the underlayment surface (see Practice F1482).

3.2.2 *non-fully adhered flooring, n*—resilient flooring that may be loose laid, in which no adhesive is utilized, or partially bonded to the surface of the underlayment, typically at seams and the surrounding perimeter of the product (see Practice F1482).

3.2.3 *thick poured lightweight cellular concrete underlayment , n*—that layer of material composed primarily of Portland cement (conforming to, Type I, II, or Block Cement) slurry,

[1] This practice is under the jurisdiction of ASTM Committee F06 on Resilient Floor Coverings and is the direct responsibility of Subcommittee F06.40 on Practices.

Current edition approved May 1, 2013. Published June 2013. Originally approved in 2005 as F2471-05. Last previous edition approved in 2008 as F2471-08. DOI: 10.1520/F2471-13.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

sand, water, pea gravel and foam that is mixed, pumped and poured at a minimum thickness of 1½ in. (38 mm) in a liquid state and installed on or over a subfloor to provide an underlayment.

3.2.4 *wood structural panel, n*—a panel manufactures from veneers, or wood strands or wafers, or a combination of veneer and wood strands, or wafers, bonded together with waterproof synthetic resins or other suitable, waterproof bonding systems.

4. Significance and Use

4.1 This practice provides minimum recommendations for the installation of thick poured lightweight cellular concrete floor underlayments suitable to receive resilient floor coverings. This practice establishes the proper preparation, installation and quality control for thick poured lightweight cellular concrete floor underlayments.

4.2 Actual requirements for thick poured lightweight cellular concrete underlayments are generally included as part of project plans or specifications and may vary from the recommendations set forth in this practice. Project plans or specifications, or both, shall supersede the recommendations set forth in this practice.

5. Product Requirements

5.1 For the purposes of this practice, thick poured lightweight cellular concrete underlayment shall be Portland cement based compounds.

5.2 Thick poured lightweight cellular concrete underlayment shall be tested for pH, measured in accordance with Practice F710. PH shall not exceed 11.

5.3 Thick poured lightweight cellular concrete underlayments shall be tested for compressive strength. Specified psi shall be a minimum of 2000 psi (13.8 MPa) for use over wood subfloors and 3000 psi (20.7 MPa) for use over concrete subfloors.

5.4 Field density checks in accordance with Specification C330 shall be made periodically and variations greater than ±1 pcf (16 kg/m^3) between the recommended density and the density at the point of discharge will require a modification to the mix. Weighing the material at the point of placement in a container of a known volume checks the cast density.

5.5 Thick poured lightweight cellular concrete underlayments shall be tested for the presence of chlorides. Thick poured lightweight cellular concrete underlayments shall not contain calcium chloride. Test method shall be provided by the manufacturer of the thick poured lightweight cellular concrete underlayment.

5.6 Thick poured lightweight cellular concrete underlayments shall be tested for density in accordance with Specification C330. Specified density shall be a minimum of 110 pcf (1762 kg/m^3).

6. Storage and Handling of Thick Poured Lightweight Cellular Concrete Underlayments

6.1 Factory-sealed containers of foaming agent shall be stored at room temperature. Materials shall be delivered to the jobsite by the manufacturer of the thick poured lightweight cellular concrete underlayment using approved methods.

7. General Guidelines

7.1 Recommended floor joist spacing is 16 in. (406 mm) on center maximum for panel assemblies. Subfloor shall support design loads with maximum L/360 deflection.

7.2 Wood and concrete subfloors shall be clean, dry, and structurally sound so as to support both the uniform design live and dead loads in compliance with the local building code and the resilient flooring manufacturers installation requirements.

7.3 The surfaces of the structural subfloor assemblies shall be clean, smooth, and free of construction wastes such as acoustic and wall texture, over spray, dirt, solvents, oil, grease, residual construction adhesives, adhesive removers, and other foreign materials. Concrete subfloors shall be 28 days or older and dry as tested by Test Method F2170.

7.4 Before, during and after installation of thick poured lightweight cellular concrete underlayment, the General Contractor shall be responsible for ensuring that the building shall be ventilated and heated to a minimum of 50°F (10°C) until subfloor and ambient temperatures have stabilized. Temperature during and after installation shall be maintained until material has completely cured. The General Contractor shall provide heat and ventilation as necessary to dry the thick poured lightweight cellular concrete underlayments. In winter, inside temperature shall not exceed 60°F (15.6°C).[3]

7.5 Installation of thick poured lightweight cellular concrete underlayment shall not begin until the building is enclosed, including roof, windows, doors and other openings. General Contractor shall be responsible to provide continuous ventilation until the underlayment is dry. Ceilings shall be sprayed or stippled to avoid over spray.

7.6 Before installation of thick poured lightweight cellular concrete underlayment, the condition of the structural subfloor assemblies and any required elevations shall be inspected and approved by the general contractor or owner, or both. All required flooring and nailing inspections shall be completed.

7.7 Thick poured lightweight cellular concrete underlayment installation shall be by an Applicator approved to do this type of installation by the manufacturer, experienced in performing the work of this practice, who has been trained in installation of work similar to the project under construction.[3]

8. Preparation of Subfloor

8.1 The structural panel subfloor assemblies shall be of wood structural panel construction, dry, level, securely nailed, and reasonably clean, without projections. Loose boards in floors with board subfloors or panels shall be renailed. Badly cupped or warped board subfloors shall be replaced before installation of underlayment. Concrete subfloors shall be 28 days or older and dry as tested by Test Method F2170.

[3] Elastizell Product Information, International Conference of Building Officials, A subsidiary of the International Conference of Building Officials Evaluation Reports No. 1381, and International Conference of Building Officials, A subsidiary of the International Conference of Building Officials Evaluation Report No. 1347.

8.2 All cracks and voids shall be covered or filled with a quick-setting taping or crack filler compound to prevent leakage.

9. Installation of Underlayment

9.1 To minimize damage caused by other trades, the procedures in Section 11 shall be followed.

9.2 Thick poured lightweight cellular underlayment thickness shall be a minimum of 1½ in. (38 mm).[3]

9.3 A subfloor bond breaker shall be required. Asphalt-impregnated Kraft paper shall be stapled to the wood subfloor.

9.4 Liquid foaming agent is diluted in water and mixed with air under pressure in a foam generator to produce stable foam. Concrete consisting of pre-formed foam is added to a cement/sand grout in a ready-mix truck to produce a thick poured lightweight cellular concrete underlayment that is pumped onto the subfloor.[3]

9.5 Where the thick poured lightweight cellular concrete underlayment widths change at alcoves and other similar recesses, it shall be reinforced with a 12 in. wide (305 mm) by 16 in. long (406 mm) strip of 4 by 4 in. (102 by 102 mm) 14/14 gauge welded wire mesh, extending each side of the corners at an angle of 45 degrees. As an alternative, plates shall be inserted through or a weakened plane joint made with a continuous 1½ in. (38 mm) by 1 in. (25 mm) light gauge steel angle divider.[3]

9.6 The maximum size of thick poured lightweight cellular concrete underlayment between control joints is 20 by 20 ft (6 by 6 m).[3]

9.7 The thick poured lightweight cellular concrete underlayment shall be scored at doorways serving rooms larger than 200 ft^2 (18.6 m^2).[3]

9.8 All areas to receive resilient floor coverings shall be steel troweled.

9.9 For sound control purposes, perimeter caulking shall be installed.[3]

9.10 If plastic shrinkage cracking occurs, even though it is repaired, a weakened section may remain which is vulnerable to further cracking. All weakened sections shall be removed.

10. Field Quality Control

10.1 Thick poured lightweight cellular concrete underlayment shall be tested for slump as it is being installed. The mix design shall be as recommended by the manufacturer of the thick poured lightweight cellular concrete underlayment.

10.2 Thick poured lightweight cellular concrete underlayments shall be tested for density. Specified density shall be a minimum of 110 pcf (1762 kg/m^3).

10.3 To determine minimum compressive strengths, specimens of poured lightweight cellular concrete shall be taken at the point of placement in 6 by 12 in. (150 by 300 mm) cylinders. Compressive strength tests shall be done in accordance with Specification C330. Manufacturer of the thick poured lightweight cellular concrete underlayment shall recommend how often sample cylinders shall be taken.

11. Protection from Other Trades

11.1 Because satisfactory performance of the finish flooring depends in part on the condition of the surface of the thick poured lightweight cellular concrete underlayment, care shall be taken to avoid traffic on the thick poured lightweight cellular concrete underlayment after installation. Loads and foot traffic shall be kept off the underlayment for 24 h. The underlayment shall not be loaded with drywall for one week. When loaded, the loads shall be distributed and not concentrated at center span. Damage to the underlayment surface or the resilient flooring installation can occur if water, oil, paint, solvent, dirt, and other debris are spilled or tracked onto the thick poured lightweight cellular concrete underlayment.

12. Preparation of Thick Poured Lightweight Cellular Concrete Underlayment Surface

12.1 Final preparation of the thick poured lightweight cellular concrete underlayment shall be accomplished just prior to application of the floor covering. The surface of the floor shall be cleaned of all loose material by scraping, brushing, vacuuming, or other methods, or combination thereof, recommended by resilient flooring manufacturer, immediately before commencing installation of resilient flooring.

12.2 All cracked areas shall be repaired and replaced if necessary. Any loose areas shall be epoxy injected.

12.3 Thick poured lightweight cellular concrete underlayments shall be tested for relative humidity in accordance with Test Method F2170.

12.4 Surface cracks, grooves, depressions, and other irregularities shall be filled or smoothed with appropriate patching or underlayment compound for filling or smoothing, or both, wood, fiber-cement, or gypsum fiber panel surfaces. Patching and self-leveling compounds for use on panel underlayments shall be moisture and alkali-resistant and suitable for commercial installations. Refer to patch and self-leveling compound manufacturer's recommendations for mix and application instructions. Also check resilient manufacturer's recommendations. See Practice F2678.

12.5 Prior to installation of finished floor goods, thick poured lightweight cellular concrete underlayment shall be tested in accordance with Test Method D4263 or with an electronic moisture meter with a concrete scale recommended by the manufacturer of the thick poured lightweight cellular concrete underlayment. Acceptance criteria for the suitability of the substrate for installation of resilient floor covering shall be provided by the manufacturer of the resilient floor covering.

12.6 The thick poured lightweight cellular concrete underlayment shall be prepared with a topcoat/sealer if required by the manufacturer of the thick poured lightweight cellular concrete underlayment or by the manufacturer of the resilient floor covering.

12.7 Final surface preparation of the thick poured lightweight cellular concrete underlayments shall be in accordance with the recommendations of the finished floor goods manufacturer. The thick poured lightweight cellular concrete underlayment shall be primed if required by the manufacturer of the

resilient floor covering prior to the installation of resilient floor covering in accordance with the recommendations of the manufacturer of the resilient floor covering.

13. Keywords

13.1 cellular; concrete; flooring; practice; resilient; sound mat; thick poured lightweight cellular concrete; underlayment