Designation: F2873 – 13

Standard Practice for the Installation of Self-Leveling Underlayment and the Preparation of Surface to Receive Resilient Flooring[1]

This standard is issued under the fixed designation F2873; 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 of self-leveling underlayments, which may include a priming system, over solid wood, wood structural panel subfloors, over concrete, and over certain solidly bonded existing flooring systems such as epoxy floors, ceramic and natural stone tiles, terrazzo, as well as properly prepared non water-soluble adhesive residues as recommended by the underlayment manufacturer. This practice also covers the preparation of the self-leveling underlayment's surface prior to the installation of resilient flooring.

1.2 This practice points out the factors that are required to be controlled while installing a self-leveling underlayment to be used as a substrate for resilient flooring.

1.3 This practice does not cover the structural adequacy of the subfloor. The structural integrity of assemblies is governed by local building codes and may be superseded by the resilient flooring manufacturer's requirements.

1.4 This practice does not supersede the self-leveling underlayment manufacturer's, adhesive manufacturer's or resilient flooring manufacturer's written instructions. Consult the individual manufacturer for specific recommendations.

1.5 Many self-leveling underlayments are not suitable for use on concrete slabs on grade or below due to potential moisture problems arising from moisture intrusion. This may occur unless an adequate vapor retarder or vapor barrier is present directly beneath the concrete slab or an effective moisture remediation system has been installed beneath the surface of the self-leveling underlayment. Consult the manufacturer of the self-leveling underlayment and flooring system for specific recommendations.

1.6 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.7 This practice does purport to address the necessity for or the safe or correct removal of asbestos containing materials. Breathing of asbestos dust is hazardous. Asbestos and asbestos products present demonstrated health risks for users and for those with whom they come into contact. In addition to other precautions, when working with asbestos-cement products, minimize the dust that results. For information on the safe use of chrysoltile asbestos, refer to "Safe Use of Chrysotile Asbestos: A Manual on Preventive and Control Measures."[2]

1.8 *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:*[3]

C219 Terminology Relating to Hydraulic Cement

C1583 Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)

C1708 Test Methods for Self-leveling Mortars Containing Hydraulic Cements

F141 Terminology Relating to Resilient Floor Coverings

F710 Practice for Preparing Concrete Floors to Receive Resilient Flooring

F1869 Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

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

F2420 Test Method for Determining Relative Humidity on the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement and Insulated Hood

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

[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.

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[2] Available from http://www.chrysotile.com

[3] 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.

C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

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.

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.

3.2.3 *self-leveling underlayment system, n*—a non-structural, hydraulic cement-based, poured mortar composed primarily of hydraulic cements, fillers or fine aggregate, and water, which may require the use of a primer to enhance bond strength and inhibit pin hole development, and which is intended to provide a flat, smooth surface for the finished floor covering.

3.2.4 *subfloor, n*—a structurally sound layer intended to provide support for design loads, which may receive resilient floor coverings directly if the surface is suitable to the flooring manufacturer.

3.2.5 *wood structural panel, n*—a panel manufactured 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 such that they are considered to be Type 1 for exterior exposure. Lauaun plywood is not recommended to receive self-leveling compounds represented in this practice.

4. Significance and Use

4.1 This practice provides minimum recommendations for the installation of self-leveling underlayments suitable to receive resilient floor coverings. This practice establishes the proper preparation of the subfloor, and installation methods and quality control requirements for self-leveling underlayments. This practice addresses the preparation of the self-leveling underlayment's surface prior to the installation of floor coverings.

4.2 Actual requirements for self-leveling underlayments are generally included as part of project plans or specifications and may vary from the recommendations set forth in this practice. Provisions in the project documents at variance with this practice shall take precedence.

5. Product Requirements

5.1 For the purpose of this practice, self-leveling underlayment shall be hydraulic cement based compounds, as defined in 3.2.4 in accordance with Terminology C219.

5.2 Self-leveling underlayments shall be tested for compressive strength in accordance with Test Method C109/C109M modified (air-cured only as detailed in Test Methods C1708). Specified psi at 28 days shall be a minimum of 3000 psi (20.7 MPa).

6. Storage and Handling of Self-Leveling Underlayments

6.1 Self-leveling underlayments included in this practice shall be delivered to the jobsites in original, unopened, undamaged bags with identification labels intact. Bags and the enclosed material should not be damaged and shall be protected from the elements after delivery to the jobsite.

6.2 All products shall be kept off the ground and protected from moisture and excessive heat or cold in accordance with the manufacturer's recommendations.

7. General Guidelines

7.1 The subfloor shall support design loads as required by the prevailing building code but no greater than L/360. Use the strictest criteria applicable.

7.2 Subfloors shall be structurally sound and dimensionally stable so as to support both the uniform design live and dead loads in compliance with the local building code and the self-leveling underlayment manufacturer as well as the resilient flooring manufacturer's installation requirements.

7.3 Concrete subfloors shall be as described in Practice F710, or meet the requirements of the manufacturer of the self-leveling underlayment and the manufacturer of the resilient floor covering, or both.

7.3.1 Some self-leveling underlayments are recommended by their manufacturers for use over concrete that is less than 28 days old and may be part of a moisture remediation system.

7.3.1.1 The suitability of such materials to receive resilient floor coverings remains the sole responsibility of the self-leveling manufacturer.

7.3.2 Wood subfloors shall be installed and prepared in accordance with Practice F1482.

7.4 The HVAC system shall be operational for the minimum specified time period recommended in the moisture test(s) being performed prior to test commencement and shall remain on throughout the test to ensure accurate moisture testing. Otherwise, condition a test area to "in service condition" before testing.

7.5 Concrete subfloors that exceed the floor covering manufacturer's requirements for moisture in 7.4 shall either be made to dry out until the moisture requirements are within the flooring manufacturer's limits or shall be remediated using products that are suitable to receive underlayments represented in this practice.

7.6 Forty eight hours before, during and 72 h after installation of the self-leveling underlayment is completed, the general contractor shall be responsible for ensuring that the building and substrate shall be ventilated and heated to a minimum of 50°F (10°C) and a maximum of 90°F (32.2°C) and with a maximum relative humidity of 70 % until subfloor and ambient conditions have stabilized.

7.7 Installation of the self-leveling underlayment shall not begin until the building is enclosed, including roof, windows,

doors and other openings, unless the underlayment being installed is totally water resistant, or is otherwise unaffected by casual water. It is recommended that all overhead work be completed prior to underlayment installation, to minimize surface damage.

7.8 Before installation of self-leveling 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, as being suitable to receive the self-leveling underlayment to meet the flooring manufacturer's requirements.

7.9 Self-leveling underlayment installation shall be performed by an applicator trained to do this type of installation by the manufacturer of the self-leveling underlayment system, or one that can verify experience in performing the work of this practice.

7.10 The general contractor shall protect the self-leveling underlayment, once installed, from drafts, direct sunlight, excessive heat, and direct exposure construction and trade traffic.

7.10.1 Failure to adequately protect the surface of the self-leveling underlayment from the above conditions will result in a need for additional surface preparation on the self-leveling underlayment prior to installation of the resilient flooring.

8. Preparation of Subfloor/Underlayment Panels

8.1 The wood subfloor shall be of solid wood or structural wood panel construction installed in accordance with Practice F1482, clean, permanently dry, and free of any oil, grease, dirt, and other contaminating substances that could affect the performance or act as a bond breaker. Loose boards shall be mechanically fastened. Badly cupped or warped board subfloors shall be replaced before installation of underlayment. Any loose sections shall be fastened and any weak or delaminated sections shall be removed and replaced.

8.2 The surfaces of the concrete structural subfloor shall be dry, clean, and free of construction wastes such as acoustic and wall texture, dry wall compound over spray, dirt, laitance, solvents, oil, grease, loosely bonded toppings, dust, tar, wax, residual adhesives, adhesive removers, curing and sealing compounds and other foreign materials as recommended by the manufacturer of the self-leveling underlayment. To ensure maximum bonding of the self-leveling underlayment to the concrete subfloor, mechanical profiling may be recommended. Consult the manufacturer of self-leveling underlayment for specific requirements. All warnings shall be adhered to in accordance with Practice F710. (Refer to Supplemental Requirements Section S1.) Steel troweled concrete, concrete sealed with curing compounds and any substance that could act as a bondbreaker shall be shot blasted or scarified by mechanical means. The surface removal must be sufficient to eliminate penetrated contaminants. Acid washing or etching and the use of sweeping compounds and solvent adhesive removers shall not be acceptable.

8.3 The surfaces of other substrates shall be clean and free of any contaminants that may reduce performance or act as a bond breaker. All ceramic and stone tiles shall be solidly adhered. Remove all loose tiles. Terrazzo surfaces shall be stripped of any dressings and each metal divider strip shall be coated with either a waterborne epoxy primer or 100 % solids epoxy/sand broadcast method as per manufacturer's instructions. Epoxy flooring systems shall be verified and confirmed to be solidly bonded. Remove any loose or weak areas. Existing non-water soluble adhesive residues shall be wet-scraped to a thin, well-bonded residue using the guidelines set forth by the Resilient Floor Covering Institute. Contact the self-leveling underlayment manufacturer for specific recommendations on using their underlayment over adhesive residues.

8.4 All cracks, voids and penetrations shall be sealed or filled with a cementitious patching compound or other suitable repair material as recommended by the underlayment manufacturer for filling and smoothing to prevent loss of material during pouring.

8.5 Prior to installing the self-leveling underlayment, the concrete subfloor moisture vapor emission rate or in situ relative humidity when tested in accordance with Test Method F1869 or Test Method F2170 shall not exceed the maximum(s) recommended by the self-leveling underlayment and flooring manufacturer.

8.6 Concrete subfloors that exceed the above requirements shall either be allowed to continue to dry until the above levels are met or be remediated using a system that may include the installation of a self-leveling underlayment as represented in this practice. A bond test of the underlayment to the subfloor surface which has been treated with the moisture mitigation system may be required by the manufacturer of the self-leveling underlayment.

8.7 Where required by the manufacturer of the self-leveling underlayment or flooring manufacturer, bond tests on either the concrete substrate or the self-leveling underlayment shall be in performed in accordance with Test Method C1583.

9. Installment of Underlayment

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

9.2 The minimum thickness of the self-leveling underlayment shall be at least ⅛ in. or as recommended by the underlayment manufacturer as being suitable for the adhesive and floor covering to be installed, provided that this minimum shall not be less than any minimum thickness required by the flooring manufacturer for the flooring system to be installed.

9.3 The subfloor shall be primed or have a sealer applied if required as recommended by the manufacturer of the self-leveling underlayment.

9.4 Expansion joints, isolation joints and all joints designed for movement shall be continued through the self-leveling underlayment.

9.5 The maximum width of the self-leveling underlayment installation between control joints is unlimited but the self-leveling underlayment shall honor the existing moving joints in the concrete substrate.

9.6 Cracks in the subfloor may reflect through the installed underlayment even though such cracks had been repaired. If cracks do telegraph, repair as provided in 12.2.

9.7 The self-leveling underlayment shall be mixed using a mechanical drill and mixing paddle or by pumping per recommendations of the self-leveling manufacturer.

9.8 The self-leveling underlayment shall be poured or pumped onto the structural substrate at the specified thickness.

9.9 The self-leveling underlayment shall be dry prior to the installation of the resilient flooring. The duration of time and ambient conditions required to achieve that or test method to confirm that shall be determined by the underlayment manufacturer.

10. Field Quality Control

10.1 Self-leveling underlayments shall be tested for density. Specified density shall be a minimum of 100 pcf (1602 kg/m^3).

10.2 To determine minimum compressive strengths, unopened bags of the product shall be taken from the jobsite to a testing laboratory and specimens of self-leveling underlayments shall be made in 2 by 2 in. cubes (51 by 51 mm) meeting Test Method C109/C109M. The underlayment manufacturer shall specify the mix water ratio and compaction of the powder. Sample preparation and mixing methods shall be done in accordance with a modified Test Method C109/C109M (air-cured only). The architect, owner, or general contractor, or combination thereof, shall specify the schedule as to how representative bags of product shall be taken.

10.3 The surface of the self-leveling underlayment surface shall be in accordance with Practice F710, Sections 4.2, 4.3, 4.4 and 4.6.

11. Protection after Installation

11.1 Because satisfactory performance of the finished flooring depends in part on the condition of the surface of the self-leveling underlayment, care shall be taken to avoid traffic on the self-leveling underlayment after installation. 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 due to trade traffic, or if water, oil, paint, solvents or other liquids, along with dirt and other debris are spilled or tracked onto the self-leveling underlayment.

12. Preparation of Self-Leveling Underlayment Surface

12.1 Final preparation of the self-leveling 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, lightly sanding, vacuuming with a brush attachment or other methods, or combination thereof, as recommended by the manufacturer of the resilient flooring, immediately before commencing installation of resilient flooring.

12.2 All cracks and loose areas shall be repaired and replaced, if necessary. Surface cracks, grooves, depressions and other irregularities shall be filled or smoothed with appropriate patching or underlayment compound for filling or smoothing. The manufacturer of the resilient flooring shall provide acceptance criteria for the suitability of the substrate for installation of resilient flooring.

12.3 The manufacturer of the self-leveling underlayment shall be responsible for specifying the amount of drying time necessary for the underlayment to receive the adhesive and floor covering.

12.4 Final surface preparation of the self-leveling underlayment shall be in accordance with the recommendations of the resilient flooring manufacturer. The self-leveling underlayment shall be primed if required by the manufacturer of the resilient flooring or the adhesive supplier prior to the installation of resilient flooring in accordance with the recommendations of the manufacturer of the resilient flooring.

13. Keywords

13.1 concrete; flooring; hydraulic cement; practice; resilient; resilient flooring; self-leveling underlayment; underlayment

SUPPLEMENTARY REQUIREMENTS

S1. RECOMMENDED WORK PRACTICES FOR REMOVAL OF RESILIENT FLOOR COVERINGS (www.rfci.org)

The following supplementary requirements shall apply only when specified by the purchaser in the purchase order or contract.

S1.1 *Asbestos Warning*—Do not sand, dry sweep, dry scrape, drill, saw, bead blast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, paint, asphaltic "cutback" adhesives, or other adhesives. These products may contain asbestos fibers or crystalline silica. Avoid creating dust. Inhalation of such dust is a cancer and respiratory tract hazard. Smoking by individuals exposed to asbestos fibers greatly increases the risk of serious bodily harm. Unless positively certain that the product is a non-asbestos-containing material, you must presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content. The Resilient Floor Covering Institute (RFCI) document, "Recommended Work Practices for Removal of Resilient Floor Coverings," should be consulted for a defined set of instructions addressed to the task of removing all resilient floor covering structures.

S1.2 *Lead Paint Caution*—Certain paints may contain lead. Exposure to excessive amounts of lead dust presents a health hazard. Refer to applicable federal, state, and local laws and, "Lead-Based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing," (September 1990) or subsequent editions published by the U.S. Department of Housing and Urban Development regarding: (*1*) Appropriate methods for identifying lead-based paint and removing such paint; and (*2*) any licensing, certification, and training requirements for persons performing lead abatement work.

S1.3 *Adhesive Remover Caution*—There are a number of commercial adhesive removers on the market that will properly remove adhesive residue from a subfloor, however, there are concerns that these products can adversely affect the bonding of the new floor covering. The Resilient Floor Covering Institute (RFCI) document, "Recommended Work Practices for Removal of Resilient Floor Coverings," and the resilient flooring manufacturer's written instructions should be consulted for a defined set of instructions which should be followed if existing adhesives must be removed (see S1.1).

S1.4 *Residual Asphalt Adhesive*—(Also see S1.1 and S1.3.) Many resilient floor coverings may not be installed when residual asphalt adhesive residue is present. However, there are self-leveling underlayments that have been successfully installed over such residues for many years. Consult the self-leveling underlayment manufacturer's written recommendations concerning use of self-leveling underlayment products in these situations.