Designation: F2421 – 05 (Reapproved 2011)

Standard Test Method for Measurement of Resilient Floor Plank by Dial Gage[1]

This standard is issued under the fixed designation F2421; 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 test method establishes the procedures for determination of both dimension (length and width) and squareness of resilient floor plank. This test method is intended for use with rectangular plank up to 36 in. (915 mm).

1.2 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.

1.3 *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.* Specific precautionary statements are provided in applicable sections of this test method.

1.4 The values stated in inch-pounds units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F141 Terminology Relating to Resilient Floor Coverings

2.2 *ANSI Standards:*[3]

ANSI/ASQC Z1.4-1993 Sampling Procedures and Tables for Inspection by Attributes

3. Terminology

3.1 *Definitions:* For definitions of terms used in this test method, refer to Terminology F141.

4. Significance and Use

4.1 The combination of both dimensional and squareness of resilient floor plank is an important consideration because installed flooring may exhibit an objectionable appearance when either or both characteristics deviate from established tolerances. This test method provides a means of determining actual dimensional and squareness by using a single apparatus and procedure.

5. Apparatus

5.1 The apparatus[4] shall consist of five dial gages and two reference index strips mounted on a flat bedplate in a configuration that, by rotation and flipping of the sample, allows the measurement of all four sides of resilient plank samples. (See Fig. 1). One edge of the bedplate is elevated to create a test surface, which is offset or tilted 15+/-1 degrees from horizontal. The offset applies minimal pressure to the test specimen against the longer index strip to ensure repeatable measurement. A reference plate[4] representing target plank size and squareness (see Fig. 2) is used to zero all dial gages.

5.2 *Dial Gages*—The five dial gages are mounted in guide slots, which are machined into the bedplate to allow for measurement of various plank sizes. For the two corner gages (B & D) and the squareness gage (A) the position must be at least within 10 % of the corner edge relative to the respective length and width of the plank. For the center gages (C & E) the position must be at least within 10 % of the centerline relative to the respective length and width of the plank. Any dial gages may report measurements using either electrical or mechanical means, but shall be graduated to read to the 0.001 in. (0.025 mm) and have a stem travel greater than 0.25 in. (6.4 mm). The contact foot of the dial-gage stem shall be flat, 0.50 to 0.75 ± 0.001 in. (12.7-19.1 mm ± 0.025 mm) in diameter and exert a total force of not more than 3.0 ± 0.1ozf (0.83 ± 0.003 N). Dial gages shall be positioned securely so that when the reference plate is in place, the contact foot is extended approximately 50 % of its full travel.

5.3 *Index Strips*—The apparatus contains two fixed index strips. A horizontal index strip shall be mounted parallel to and just inside the lower edge of the bedplate. It shall be 1.5 ± 0.1

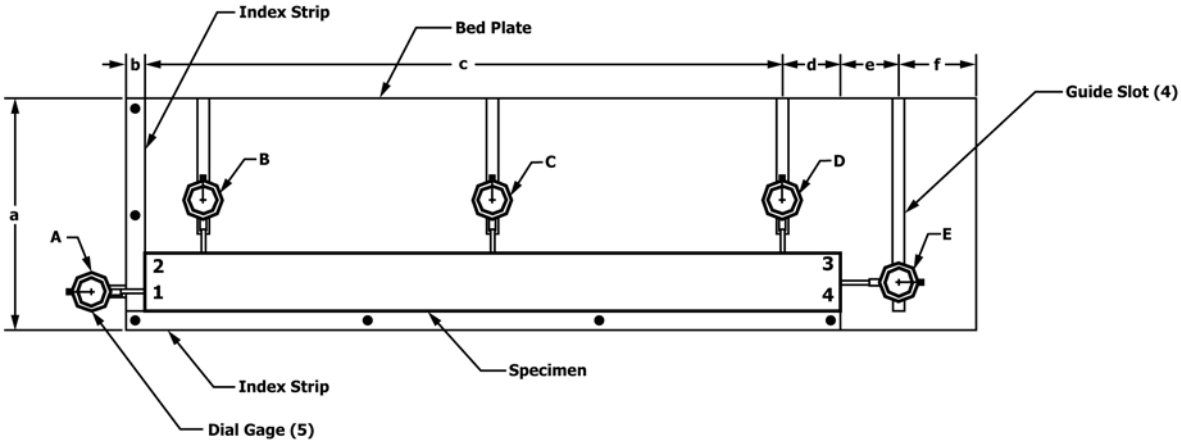
[1] This test method is under jurisdiction of ASTM F06 Committee on Resilient Floor Coverings and is the direct responsibility of subcommittee F06.20 on Test Methods - Products Construction/Materials

Current edition approved Nov. 1, 2011. Published November 2011. Originally approved in 2005. Last previous edition approved in 2005 as F2421–05. DOI: 10.1520/F2421-05R11.

[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.

[3] Available from American National Standards Institute, 25 West 43rd St., New York, NY 10036.

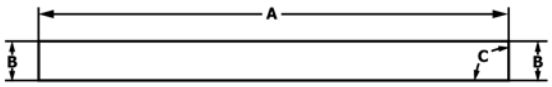
[4] Available from Frazier Precision Instrument Company, Inc., 925 N Sweeney Drive, Hagerstown, MD, 21740, USA.



Dimensions

	in.		mm	
	Dimension	tolerance	Dimension	tolerance
a	12		305	
b	1		25	
c	33		838	
d	3		76	
e	3		76	
f	4		102	

FIG. 1 Plank Measurement Apparatus



A: Length Dimension +/– 0.001 in (0.025 mm)
B: Width Dimension +/– 0.001 in (0.025 mm)
C: 90 degrees +/– 10s (1.57080 +/– 0.0005) rad

FIG. 2 Reference Plate

in. (38 ± 3 mm) greater in length and a minimum of twice the thickness of the largest plank to be tested. A second strip shall be mounted 90 degrees ± 10 s (1.57080 ± 0.00005 rad.) to the horizontal index strip. The lower end of this index strip shall be 0.15 ± 0.01 in. (3.1 ± 0.25 mm) above the left end of the horizontal index strip and is used to locate one corner of the sample plank (see Fig. 1).

5.4 *Reference Plate*—The reference plate shall be made of stainless steel/aluminum to the target dimensions of the manufactured plank. The length and width dimensions shall be within 0.001 in. and the space angle shall be 90° ± 10 s (1.57080 ± 0.0005 rad.) to one another and are used to set the squareness and dimension gage to zero.

6. Specimens

6.1 The specimens shall consist of 5 sample planks.

7. Sampling

7.1 For sampling, refer to ANSI/ASQC Z1.4–1993.[3] The inspection level shall be special inspection level S1 as noted in Table 1 and the acceptable quality level (AQL) shall be 6.5 defects per hundred units as noted in Table 11-A. The lot size shall be expressed in units. A unit represents a single, manufactured, inventoried, finished plank.

8. Conditioning

8.1 Condition the test specimens, apparatus, and reference plate for a minimum of 24 h at 73.4 ± 1.8ºF (23º ± 1ºC) and 50 ± 5 % relative humidity. Tests shall be conducted in this same environment. Samples shall be conditioned on a flat surface such as a table or floor surface to ensure they will contact the bedplate uniformly during measurement.

9. Procedure

9.1 **Calibration** —Place the appropriate reference plate onto the bedplate surface and slide it firmly against the two index strips. Set each of the five dial indicators to zero. Remove the reference plate. All dial indicators will now reflect their fully extended measurements. In the case of digital dial indicators, the display will indicate a negative number. In the

case of mechanical dial indicators, the display will move counter-clockwise from zero. (Note: Dirt and foreign particles may collect along the upper face of the index strip and affect the "zero" set point. Use a small brush to maintain the cleanliness of the index strip surface before each use.)

9.2 *Measure Size and Squareness*—Starting with the corner where the index strips meet, number the corners of the plank from 1 to 4 in a clockwise direction.

9.2.1 Place the plank into the apparatus and carefully move it into position such that it will depress all five dials gages and is in firm contact with bottom index strips. Record the measurements on all five gages to the nearest 0.001 in. (0.025mm).

9.2.2 Remove the plank from the bedplate and rotate it 180 degrees in the clockwise direction. Place the plank back into the apparatus repeating the processes described in 9.2.1

9.2.3 Remove the plank from the bedplate and flip it toward you. Place the plank (now numbered side down) back into the apparatus and repeat the processes described in 9.2.1 and 9.2.2, recording only the squareness measurement from gage A to the nearest 0.001in. (0.025 mm).

9.3 After all samples have been measured, place the reference gage back on the bedplate to verify that no movement of dial gages has occurred. A movement of greater than 0.001 in. (0.025 mm) shall be cause to repeat the measurement process.

10. Calculation

10.1 *Plank Size*—Record all measurements in the format shown in Table 1. Measurements shall be recorded to the nearest 0.001 in. (0.025 mm) for all gages. The two rotations provide two measurements of the length and width at the center and both edges of the plank. Report the dimensions and squareness using the formulas in 10.3.

TABLE 1 Typical Measurement Data

Rotation		Gage A	Gage B	Gage C	Gage D	Gage E
First set	1					
Rotation 1	2					
Flip 1	3					
Rotation 2	4					

10.2 *Plank Squareness*—Perform the following calculations using Table 1 data to determine squareness deviations for the plank sample using the formulas in 10.3.

10.3 Formulations

Length and Width Deviation		Squareness Deviation	
Length Deviation=	(1E+2E)/2		Corner 1 = (1A)
			Corner 3 = (2A)
		(Flip)	Corner 4 = (3A)
Width Deviation, Left =	(1B+2D)/2		Corner 2 = (4A)
Width Deviation, Center =	(1C+2C)/2		
Width Deviation, Right =	(1D+2B)/2		

11. Report

11.1 The final report shall include:

11.1.1 Plank size,

11.1.2 Test date, and

11.1.3 Size and squareness data.

12. Precision and Bias

12.1 *Precision*—The repeatability and reproducibility of this test method is in the process of being established.

12.2 *Bias*—The bias of this test method is in the process of being established.