



Designation: F1566 – 09

## Standard Test Methods for Evaluation of Innersprings, Boxsprings, Mattresses or Mattress Sets<sup>1</sup>

This standard is issued under the fixed designation F1566; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 These test methods cover recognized methods for testing mattress innersprings, boxsprings, and finished mattresses or mattress sets, or both, to ensure uniformity of results.

1.2 These test methods are applicable to un-upholstered mattress core units including but not limited to innersprings, air chambers, and foam cores, un-upholstered foundations including but not limited to boxspring and build up foundations, finished foundations and mattress constructions. Data developed is for comparative analysis with no pass/fail criteria applicable.

1.3 The durability test (Section 7), impact test (Section 8) and firmness retention test/surface deformation (Section 9) require upholstered samples. Firmness testing may be ran on un-upholstered components, innerspring units and flexible boxsprings (6.1 through 6.4), or finished mattresses or mattress sets (6.5 through 6.8). A standardized upholstery package is specified if evaluating a mattress core or un-upholstered foundation. These test methods are intended to be used on newly manufactured products..

1.4 The values stated in SI units are to be regarded as standard. The values in parentheses are for information only.

1.5 *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:<sup>2</sup>

E4 Practices for Force Verification of Testing Machines

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee F15 on Consumer Products and are the direct responsibility of Subcommittee F15.32 on Innersprings and Boxsprings.

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<sup>2</sup> 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. Terminology

3.1 *Definitions:*

3.1.1 *boxspring unit, n*—foundation for the mattress consisting of wire spring elements mounted on a frame.

3.1.2 *boxspring, upholstered, n*—foundation for the mattress consisting of wire spring elements mounted on a frame, generally upholstered and covered on top and sides with ticking, and bottom with a dust cover.

3.1.3 *foundation, n*—support base for a finished mattress generally upholstered and covered on top and sides with ticking, and bottom with a dust cover.

3.1.4 *innerspring unit, n*—interconnection of wire spring elements other than mounting on a frame that forms a single unit that can be incorporated into a mattress.

3.1.5 *mattress, innerspring, n*—any mattress containing an innerspring unit.

3.1.6 *posturized innerspring, n*—innerspring assembly having a varying coil density or varying wire gauge.

3.1.7 *mattress, n*—finished, assembled mattress core with upholstery package and cover.

3.1.8 *mattress core, n*—innermost support core of a mattress upon which upholstery is affixed.

3.1.9 *mattress set, n*—finished mattress and foundation combination.

3.1.10 *upholstery, n*—combination of materials designed to cover and add support or comfort, or both, to a mattress core.

### 4. Significance and Use

4.1 Two separate test methods are outlined for use in evaluation of (1) mattress components, innersprings and boxsprings and (2) mattresses and mattress sets.

4.2 Component innerspring and boxspring test methods include measurements of firmness, firmness retention, durability, and effect of impact.

4.3 Mattress and mattress set test methods include measurements of firmness, firmness retention, durability, effect of impact, and height change.

4.4 One or more of the test methods shall be used separately or in combination to provide for appropriate evaluations.

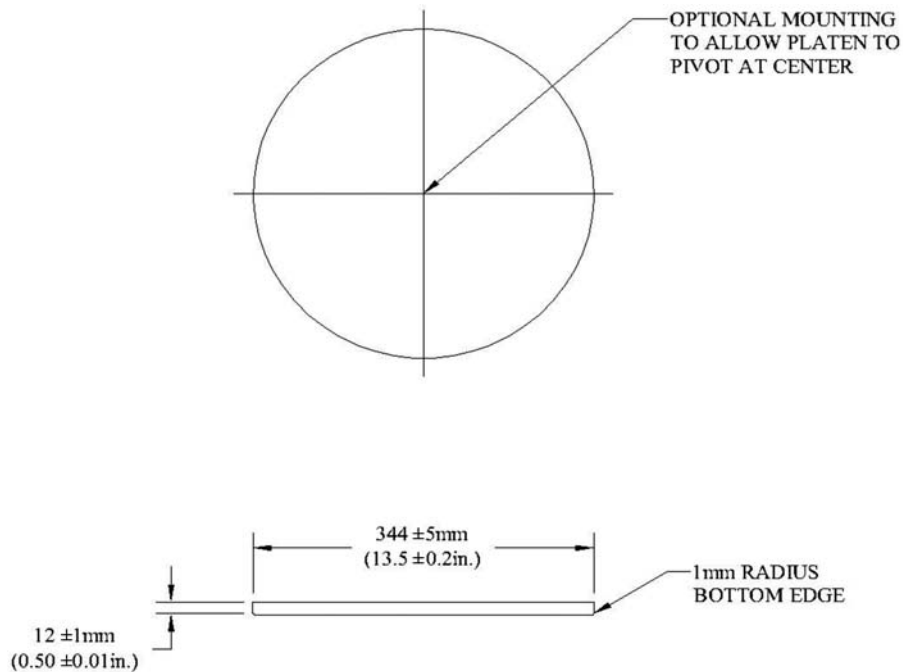


FIG. 1 Firmness Platen

## 5. Conditioning

5.1 Before testing, condition units for a minimum of 8 h at  $23 \pm 2.8^\circ\text{C}$  ( $73.4 \pm 5^\circ\text{F}$ ), with a relative humidity of  $50 \pm 5\%$ , in a flat position.

## 6. Firmness Rating

### INNERSPRING AND FLEXIBLE FOUNDATION

6.1 *Specimen*—The unit to be tested is an un-upholstered mattress core or flexible foundation unit.

#### 6.2 Apparatus:

6.2.1 *Platen*—The platen shall be a round rigid disk with a diameter of  $344 \pm 5$  mm ( $13.54 \pm 0.2$  in.) connected to the loading mechanism with a flexible connection (see Fig. 1).

6.2.2 *Loading Mechanism*<sup>3</sup>—A device capable of providing a load of 1335 N (300 lbf) or more with accuracy of  $\pm 1\%$ .

6.2.3 *Deflection Device*—For use in determining deflection, that is, ruler or electronic device accurate to 1 mm ( $1/32$  in.) with minimum stroke of 101.6 mm (4 in.).

#### 6.3 Test Procedure:

6.3.1 Place specimen directly onto a rigid, flat surface.

6.3.2 Run tests at four separate locations as shown in Fig. 2, Location 5 being optional.

6.3.3 At each test location, determine resistance values in 2-N (0.5-lbf) increments at 12.5, 25, 38, 50, 63, and 76 mm (0.5, 1, 1.5, 2, 2.5, and 3 in.) with a tolerance of  $\pm 1$  mm ( $\pm 0.04$  in.) of deflection of the top surface for innersprings and 12.5 and 25 mm (0.5 and 1 in.) with a tolerance of  $\pm 1$  mm ( $\pm 0.04$  in.) of deflection of the top surface for flexible foundations.

6.3.4 The zero reference point shall be determined using a common contact force of 4.4 N (1 lb).

6.3.5 The test speed is  $50 \pm 5$  mm/min ( $2 \pm 0.2$  in./min).

#### 6.4 Calculation/Results:

6.4.1 Determine a firmness rating for a uniformly constructed innerspring unit by totaling resistance values at Locations 3 and 4 for all deflections and dividing the total by two for an average.

6.4.2 Determine firmness rating for a non-uniformly constructed (posturized) innerspring unit by using resistance values at Location 3 only.

6.4.3 Determine a firmness rating for the calf/shoulder area using the values at Location 4 only. Any difference between readings 3 and 4 will be calculated as a percentage of increase of Location 3 over the readings at Location 4.

6.4.4 Determine a firmness rating for the edge by totaling the resistance values at Locations 1 and 2 for all deflections and dividing the total by two for an average.

6.4.5 *Optional*—Determine a firmness rating of the corner by totaling the resistance value for all deflections at Location 5.

### MATTRESS OR MATTRESS SET, OR BOTH

6.5 *Specimen*—The unit to be tested is a mattress or mattress set.

#### 6.6 Apparatus:

6.6.1 *Platen*—The platen shall be a round rigid disk with a diameter of  $344 \pm 5$  mm ( $13.54 \pm 0.2$  in.) connected to the loading mechanism with a flexible connection (see Fig. 1).

6.6.2 *Loading Mechanism*<sup>3</sup>—A device capable of providing a load of 1335 N (300 lbf) or more with accuracy of  $\pm 1\%$ .

6.6.3 *Deflection Device*—For use in determining deflection, that is, a ruler or electronic device accurate to 1 mm ( $1/32$  in.) with a minimum stroke of 203.2 mm (8 in.).

<sup>3</sup> See Practices E4 for calibration techniques.