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An American National Standard

Standard Specification for Determining the Rating Velocities of a Compound Archery Bow[1]

This standard is issued under the fixed designation F1544; 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 specification covers the testing technique to determine the rating velocities of a compound bow.

1.2 This specification will provide only a certification of performance, that is, the velocities at which a given bow will launch arrows of specified weights under standard conditions.

1.3 This specification is not intended to provide any engineering or structural evaluation of the bow that would determine its fitness for the use intended, safe function, or any other attribute except as stated.

1.4 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.

1.5 The following safety hazards caveat pertains only to the test methods portion, Section 4, of this specification: *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. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *archery trade association (ATA) draw length, n*—the distance at the archer's full draw from the string at the nocking point to a vertical line through the pivot point of the bow grip 1¾ in. (+¼ in., –0 in.) (44 + 6.4 – 0 mm).

2.1.2 *draw length pressure point (DLPP) draw length, n*—the distance at the archer's full draw from the string at the nocking point to a vertical line through the distal or pivot point of the bow grip.

2.1.3 *force-draw curve*—the graph curve generated by recording the draw force readings of an archery bow at 1.0-in. (25.4-mm) intervals or less, from brace height through set weight and to the center of the valley (if present), in order to reveal the energy storage characteristics of the bow.

2.1.4 *rating velocities, n*—the initial velocity of an arrow weighing 5 grains per pound (0.073 g/N) of the bow's Peak Draw Force (±0.5 grains (±0.03 g) on total arrow weight) (0.03 g) from a bow set at no more than 70 ± ½ lb (311.4 N) Peak Draw Force and 30 in. (762 mm) ATA actual draw length. Example: a 70-lb Peak Draw Force bow requires the use of a 350 grain (22.7 g) arrow (±0.5 grains (±0.03 g) on total arrow weight) (0.03 g ± 0.4 N). A minimum of (5) shots for each test must be performed. Test shot velocities will then be averaged to determine the ATA Compound Bow Rating Velocity.

2.1.5 *shooting machine*—a device, equipped with a mechanical release, that secures a bow and releases an arrow to obtain highly repeatable shooting results for various testing purposes.

2.1.6 *stored energy*—the energy required to draw a bow from brace height to full draw, usually expressed in foot-pounds (joules).

3. Significance and Use

3.1 This specification will be used to determine a velocity under standard test conditions for rating an archery bow.

4. Test Methods

4.1 *Force Draw Data:*

4.1.1 For bows with adjustable draw force, adjust peak or maximum draw force to no more than 70 ± 0.5 lb (311.4 ± 2.22 N). The center of the valley of the force-draw curve (lowest force) attained after having passed through the peak or maximum draw force shall be located at 28¼-in. (717.6 mm) DLPP, +¼ –0 in. (6 mm).

4.1.2 Measure and record the draw force at 1.0-in. (25.4-mm) (or less) increments from brace height to at least 28¼-in. (717-mm) DLPP (30-in. (762-mm) ATA) draw length.

4.1.3 From the force-draw curve (obtained in 4.1.2), determine the peak or maximum draw force that occurs between the brace position of the bow and the full draw length of 28¼-in. (717-mm) DLPP (30-in. (762-mm) ATA).

4.2 *Test Arrows:*

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4.2.1 Select the test arrows of a shaft material, size, and sufficient spine to match the test bow's Peak Draw Force and draw length. The test arrows must also meet the 5 grain per pound (0.073 g/N) of the test bow's Peak Draw Force weight requirement (±0.5 grain (0.03 g). (Refer to example shown in 2.1.4).

4.2.2 The arrows need not be fletched.

4.3 Set up the test bow in the shooting machine.

4.3.1 Mount the bow in a shooting machine with a mechanical release. Set the draw length at 28¼-in. (717-mm) DLPP (30 + ⅛, – 0 in. (762 + 3.2, – 0 mm) ATA).

4.3.2 Set the initial chronograph gate at a distance of 36 in. (914 mm) from the pivot point of the bows handle.

4.4 *Shooting Test:*

4.4.1 Chronograph a minimum of five shots for each test arrow using the standard test arrow to obtain a satisfactory arrow velocity average. The average velocity is determined from a minimum of five shots of the test arrow in which no test velocity more than 2 ft/s (0.61 m/s) from any other test velocity.

4.4.2 Use an appropriate multiple gate chronograph.

5. Keywords

5.1 draw length; force draw curve; rating velocity; shooting machine; stored energy