



Standard Specification for Pole Vault Landing Systems¹

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1. Scope

1.1 This specification covers minimum requirements of size, physical characteristics of materials, standard testing procedures, labeling and identification of pole vault landing systems.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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.*

2. Referenced Documents

2.1 ASTM Standards:²

F1292 Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment

3. Terminology

3.1 Definitions:

3.1.1 *base unit sections, n*—those components of a pole vault landing system where the pole vaulter intends to land.

3.1.1.1 *Discussion*—The base unit sections provide the majority of the padding behind the planting box. In most pole vault landing systems, they are several large rectangular sections that compose the majority of this portion of the landing system. (See Fig. 1.)

3.1.2 *common top cover, n*—the continuous covering over the top surfaces of all parts of the primary landing system.

3.1.2.1 *Discussion*—It may function both as padding and as a binder to help hold the base units and front bun sections in place during use. (See Fig. 1.)

3.1.3 *front bun sections, n*—those components of the primary landing system that pad the areas between the standard bases and around the pole vault box. (See Fig. 1.)

3.1.4 *pole vault box, n*—a trough at the end of the pole vault runway. A vaulter slides the end of the pole into the pole vault box.

3.1.4.1 *Discussion*—The pole vault box stops the forward motion of the end of the pole while allowing the pole to rotate about its end as the vaulter leaves the ground and completes a vault.

3.1.5 *pole vault landing system, n*—a device used to decelerate a free-falling pole vaulter.

3.1.6 *preferred landing zone, n*—a painted or sewn contrasting rectangle on the common top pad, 2.44 m [8 ft] deep and 3.05 m [10 ft] wide, beginning 1.07 m [42 in.] behind the reference point. (See Fig. 1.)

3.1.7 *primary landing system, n*—that portion of a pole vault landing system that consists of several components held together to form a continuous landing surface.

3.1.7.1 *Discussion*—The base unit sections, front bun sections, and common top cover are all components of the primary landing system.

3.1.8 *reference point, n*—the point defined by the intersections of the horizontal plane at the level of the runway, the vertical plane passing through the top edge of the back of the pole vault box, and the vertical plane passing through the centerline of the runway.

3.1.9 *standard base pads, n*—the pads covering the bases of the pole vault standards and the surfaces between the bases of the pole vault standards and primary landing system.

4. Minimum Overall Dimensions of Pole Vault Landing Systems

4.1 The minimum pole vault landing system dimensions stated within this document are based upon the investigation of catastrophic pole vaulting accidents.

4.2 The minimum overall dimensions for the primary landing system are 6.00 m [19 ft, 8 in.] wide by 6.15 m [20 ft, 2 in.] long from the front edge of the front buns to the rear-most edge of the landing system by 0.66 m [26 in.] high. (See Fig. 1.) If

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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.

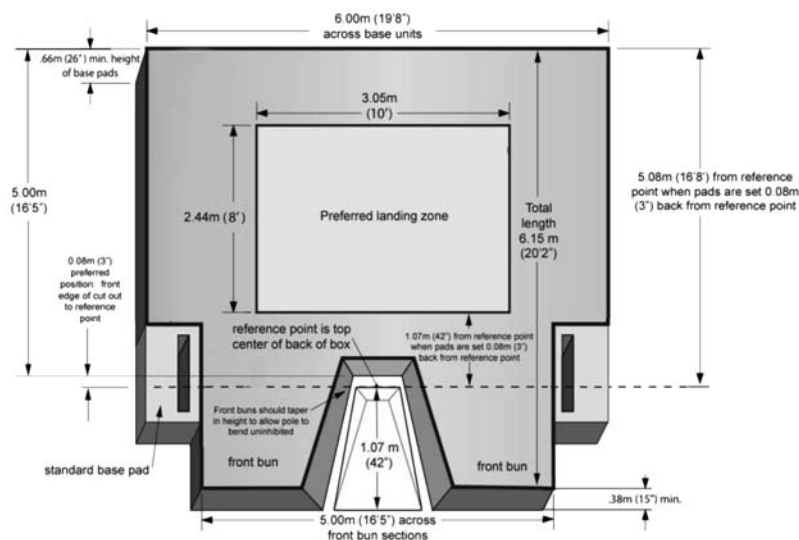


FIG. 1 Pole Vault Landing System Minimum Dimensions and Preferred Landing Zone

the front edge of the pole vault box cutout of the primary landing system is set 0.08 m [3 in.] behind the reference point, the minimum length of the landing system is 5.00 m [16 ft, 5 in.] from the front edge of the cutout of the landing system.

4.3 The minimum width across all the base unit sections is 6.00 m [19 ft, 8 in.]. This minimum width extends from the rearmost edge of the landing system to a maximum of 1.73 m [5 ft, 8 in.] behind the reference point.

4.4 The minimum width across all of the front bun sections is 5.00 m [16 ft, 5 in.]. The front edge of the front bun sections is at least 1.07 m [42 in.] in front of the reference point. The minimum total length of the pole vault box cutout is thus 1.14 m [45 in.]. The maximum width of the pole vault box cutout (the maximum distance between the bases of the front buns bordering either side of the pole vault box) measured at the base of the front buns shall be 0.91 m [36 in.].

4.5 The height of the front buns should taper downward towards the pole vault box so that the vaulting pole is allowed to bend and rotate undisturbed by contact with the front buns. Excluding this tapered portion of the front buns adjacent to the pole vault box cutout, the height of the front buns may taper from 0.66 m [26 in.] at the rear to a minimum height of 0.38 m [15 in.]. (See Fig. 1.)

4.6 Standard base pads shall be at least 0.38 m [15 in.] high and should match but not exceed the height of the adjacent primary landing system.

4.7 Standard base pads shall minimally extend laterally from the outside edges of the front bun sections to a line 3.00 m [9 ft, 10 in.] from the reference point.

4.8 Standard base pads shall extend rearward to the front edge of the lateral base unit sections.

4.9 Standard base pads shall extend forward at least as far as the front most projection of the pole vault standard bases. If the pole vault landing system includes front buns whose most forward section includes parts that project laterally in front of the pole vault standard bases, the standard base pads shall extend forward to the rear most edge of this lateral projection of the front buns.

4.10 The openings in the standard base pads for the uprights shall not be more than 0.20 m [8 in.] wide. Standard base pads shall cover the entire area of the standard bases with the exception of the opening for the uprights. The standard base pads must allow for movement of the uprights as specified in the rules.

4.11 The preferred landing zone should be identified on the top cover of the pole vault landing system by painting or sewing a contrasting rectangle on the common top cover, 2.44 m [8 ft] deep and 3.05 m [10 ft] wide, beginning 1.07 m [42 in.] behind the reference point. This rectangle is intended as a reference for vaulters and coaches. (See Fig. 1.)

5. Performance Requirements

5.1 The average peak acceleration calculated from the last two of a series of three impact tests for each impact test location within the boundaries of the preferred landing zone of the primary landing system shall not exceed 25 g when impact tested in accordance with Section 9.

5.2 The average peak acceleration calculated from the last two of a series of three impact tests for each impact test location on the primary landing system but outside the boundaries of the preferred landing zone of the pole vault landing system shall not exceed 38 g when impact tested in accordance with Section 9.

5.3 The average peak acceleration calculated from the last two of a series of three impact tests for each impact test location on the standard base pads shall not exceed 38 g when impact tested in accordance with Section 9.

6. Significance and Use

6.1 The dynamic data obtained with the procedures given in this specification measure the cushioning properties of the pole vault landing systems tested.

6.2 The size of the pole vault landing system is specified with respect to the kinematics of body movement.



7. Test Apparatus

7.1 *Impact Test System*—The test apparatus described in Section 8 of Specification F1292 is used. A free-fall impact test system shall be used.

7.2 *Missile*—The missile described in Subsection 8.2.1 of Specification F1292 shall be used for impact testing.

8. Conditioning

8.1 Pole vault landing systems shall be tested under ambient conditions that match those of intended use.

9. Impact Testing Procedure

9.1 Components of the pole vault landing system shall be separated from each other and tested in isolation.

9.2 The following landing system components shall be tested: the base unit sections, the front buns, and the standard base pads.

9.3 Each base unit section, front bun, and standard base pad shall be tested using the impact testing procedures for Installed Surface Performance Test (Field Test) of Specification F1292 with the following conditions:

9.3.1 If the pole vault landing system is tested at its use site, each landing system component shall be tested in situ but separated from all other landing system components.

9.3.2 If the pole vault landing system is tested at other than its use site, each landing system component shall be tested while resting on a flat rigid surface.

9.3.3 The impacting missile shall be dropped from a height of 3.80 m [12 ft, 5 ½ in.] above the impact test location. The 3.80 m [12 ft, 5 ½ in.] drop height is measured from the upper surface of the landing system component at the impact test location to the lowest point on the impacting missile.

9.3.4 Three consecutive impact tests shall be performed at each impact test location. The interval between impact tests shall be 1.5 ± 0.5 min. Calculate the average g-max for each impact test location by averaging results from the second and third impacts.

9.3.5 Impact tests shall be completed on each base unit section at two locations selected by the equipment operator. If the base unit section includes a portion of the preferred landing zone, at least one of the impact test locations shall be within the boundaries of the preferred landing zone. If the base unit sections are interchangeable and the landing system can be configured such that part of the base unit section being tested could be within the preferred landing zone, at least one of the impact test locations on the base unit section shall be within the possible boundaries of the preferred landing zone.

9.3.6 Impact tests shall be completed on each front bun section at two locations selected by the equipment operator. If the front bun section includes a portion of the preferred landing zone, at least one of the impact test locations shall be within the boundaries of the preferred landing zone. The selected impact locations shall not be on the tapered portions of the pole vault box cutout.

9.3.7 Impact tests shall be completed on each standard base pad at one location selected by the equipment operator.

10. Report

10.1 Report the following information:

10.1.1 *Requesting Agency Information*—The name, address, and telephone number of the person or entity requesting the test.

10.1.2 *Testing Agency Information:*

10.1.2.1 The name, address, and telephone number of the testing agency.

10.1.2.2 The name and signature of the test operator.

10.1.2.3 Date(s) tests were performed.

10.1.2.4 Date of the report.

10.1.3 *Description of the Test Apparatus:*

10.1.3.1 Test equipment type and manufacturer.

10.1.3.2 Date of most recent accelerometer calibration certificate.

10.1.4 *Test Results*—The following shall be reported for each series of impact tests:

10.1.4.1 Whether the sample was dry, wet, or frozen.

10.1.4.2 The ambient air temperature measured after the final drop in each series.

10.1.4.3 The drop height and impact velocity or fall time.

10.1.4.4 The g-max for each drop and the average g-max for the last two drops of each series.

10.1.4.5 The location of each impact test on each landing system component.

10.1.5 *Description of the Pole Vault Landing System:*

10.1.5.1 The address of the test site.

10.1.5.2 The manufacturer and the model name or number of the pole vault landing system.

10.1.5.3 The dimensions of the pole vault landing system and the dimensions each of its components.

10.1.5.4 Names, addresses, and phone numbers of the manufacturer, supplier, and installer of the pole vault landing system, to the extent they are available.

10.1.5.5 The condition of the pole vault landing system, including observations of excessive wear, rips, tears, missing fasteners, moisture content, and so forth.

10.1.6 *Test Outcome*—A statement as to whether or not the test sites conformed to the performance requirements of this specification.

10.1.7 *Statement of Specificity*—The following statement: “The results reported herein reflect the performance of the tested pole vault landing system at the time of testing and at the temperature(s) and ambient conditions reported. Performance will vary with temperature, moisture content, and other factors.”

11. Instructions and Labeling

11.1 Each pole vault landing system shall be provided with instructions for proper assembly and installation.

11.2 Each pole vault landing system shall be permanently labeled with the following items:

11.2.1 Identification of manufacturer,

11.2.2 Model designation,

11.2.3 Specific warning on installation, and

11.2.4 A warning label limiting the intended use.

12. Keywords

12.1 impact testing; landing mat; pole vault; pole vault pad; pole vault mat; pole vaulting



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