



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 pads intended for users up to 19 ft (5.74 m).

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

1.3 The following safety hazards caveat pertains only to the test methods portion, Section 8, of this specification:

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. Terminology

2.1 Definitions

2.1.1 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 the primary landing system that provide the majority of the padding behind the planting box. In most pole vault landing systems, they are several large rectangular-shaped sections that compose the vast majority of this portion of the landing system. Base unit sections should be covered by a common top cover. (See Fig. 2—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.)

2.1.2 box collar

3.1.2 *common top cover, n*—two to four inches of secondary (supplementary) padding around the sides and rear of the planting box that eliminates any and all hard surfaces between the front buns and the edges of the planting box. (See Fig. 3—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.)

2.1.3 coaches box

3.1.3 *front bun sections, n*—a painted or sewn contrasting rectangle on the common top pad, 8 ft (2.68 m) deep and 10 ft (3.05 m) wide, beginning 3.5 ft (1.06 m) behind the zero line. (See—those components of the primary landing system that pad the areas between the standard bases and around the pole vault box. (See Fig. 1.)

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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.

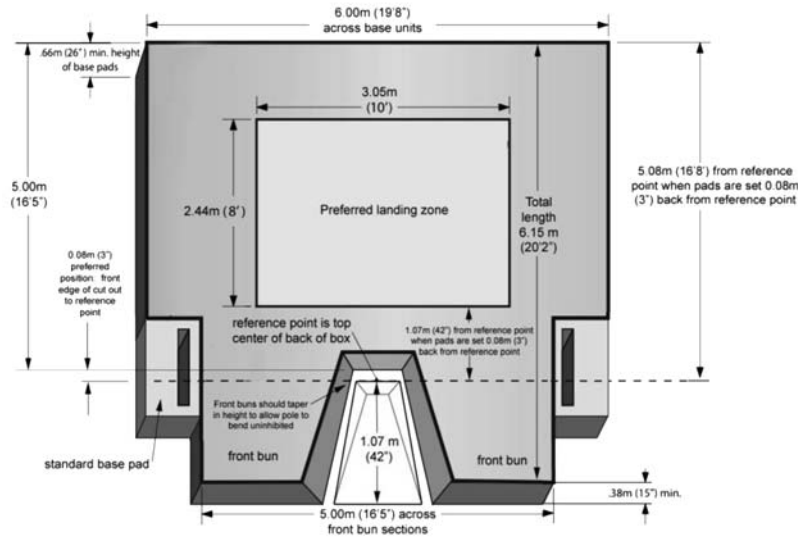


FIG. 1 Pole Vault Landing System Minimum Dimensions and Preferred Landing Zone

2.1.4 common top cover

3.1.4 pole vault box, *n*—the top surface of the primary pole vault landing system. It is designated initial landing point. It may function both as padding and as a binder to help hold the base units and front bun sections in place during use, and it also provides a smooth safe surface upon which to land. (See Fig. 2.)

2.1.5 front bun sections—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*—those components of the primary landing system that pad the areas between the standard bases and around the planting box. They should be bound together with straps to each other and to the base unit sections and to the common top pad to provide one continuous landing system. (See Fig. 2.)

2.1.6 multi-component landing system—a device used to decelerate a free-falling pole vaulter.

3.1.6 preferred landing zone, *n*—consists of several component parts or sections that form an integrated system and provide a safe, efficient landing environment.

2.1.7 pole vault landing pad—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*—a device used to decelerate a free-falling human body while pole vaulting.

2.1.8 primary landing system—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*—that portion of a multi-component landing system where the pole vaulter intends to land. It consists of several components (sections) held together with binders so that a continuous safe landing surface is provided.

2.1.9 secondary (supplementary) padding—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*—padding beyond the primary system landing areas that does not have to be covered by a common top pad. Box collars, standard base pads, and additional perimeter padding all fall into this category.

3.—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

3.1 Overall dimensions must be based on the kinematics of the human body and the shock-absorbing quality of the material. They must also be based on the comfort and safety of the user.

3.2 If the human body impacts with a 100% vertical force, the dimension must exceed the length and width of the body.

3.3 If the human body impacts with the horizontal component, the length and width of the landing surface must be derived mathematically based upon the kinematic variables involved in the performance.



Note 1—Several studies of pole vaulters indicate the following assumptions that were used to determine the pit dimensions. A vaulter reaching 19 ft (5.80 m) would have a push-off horizontal velocity of 4 ft/s (1.2 m/s). This velocity plus the length of the body would not exceed the 16 ft 5 in. (5.0 m) pit length. Less skilled vaulters reaching 10 ft (3 m) may have a push-off horizontal velocity of 8 ft/s (2.4 m/s). This velocity plus the length of the body would not exceed the 16 ft 5 in. (5.0 m) pit length.

3.4 The minimum pole vault landing system dimensions stated within this document are based upon the investigation of the reported catastrophic pole vaulting accidents over the past 20 years.

3.5 The minimum size and design specifications for pole vault landing pads are as follows: 19 ft 8 in. (6.00 m) wide across the base unit sections by 16 ft 5 in. (5.00 m) deep, when set in the most preferred position 3 in. (0.076 m) behind the vertical plane of the stop board with a uniformly high landing surface with a minimum height of 26 in. (0.66 m). The front portions of the pit that surrounds the planting box (the front buns) shall be 16 ft 5 in. (5.00 m) wide and extend at least 45 in. (1.14 m) from that portion of the front buns where the padding begins behind the back of the planting box. Thus the front of the front bun sections cover the entire area between the planting box and the inside edge of the base of the standard base rails to the front edge of the planting box when the pads are placed 3 in. (0.076 m) behind the back of the planting box. The minimum overall pit size is 19 ft 8 in. (6.00 m) wide by 20 ft 2 in. (6.14 m) long from the front of the front buns to the rear-most portion of the landing area. (See Fig. 2.) The height of the front units may taper down in 15 in. (0.381 m) at the front in order to give the vaulter a clearer approach to the vaulting box. In addition, the front buns should taper into the planting box area so that they provide protection yet allow the vaulting pole to bend and rotate undisturbed with the primary landing system a minimal distance behind the back of the planting box. (See Fig. 2)

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 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.)

3.6 In those special cases where a rectangular minimum size landing system will not fit into a facility, the rear half of the base unit sections may be rounded slightly along the outside edges to accommodate the shape of the running track or other obstruction alongside or behind it. In these special cases, the side and rear padding may be curved based upon a radius the length of the width of the base unit area of the system, from a point of origin halfway back on the side of the landing system (See Fig. 2 and Fig. 4).

3.7 Upgrades and additional supplementary padding may be used to increase the size of existing landing systems that no longer meet the new minimum specifications of this specification. Supplementary sections of padding should be attached in some way to the existing (primary) landing system to keep them from separating away from the primary landing system or each other. However, a common top cover need only cover the primary portion of the pit and not the secondary (supplementary) padding beyond the primary landing system. Secondary (supplementary) padding may also take the form of protection on the standard bases and around the planting box. (See Fig. 4.)

3.8 Standard base padding is considered supplementary (secondary) padding. Standard base pads should be designed so that the uprights move freely both forward and back for efficient, accurate standard adjustments. Standard base padding systems should be approximately the same height as the front of the front buns for which they are built. However, standard base padding should not exceed the height of the front bun sections that they sit next to. Standard base padding should be a minimum of 20 in. (0.51 m) wide so that they minimally extend from the sides of the front bun sections to the outside edges of the base unit sections. The openings for the uprights should not be more than 8 in. (0.20 m) wide. For solid foam systems, a minimum of 14 in. of padding should cover all hard standard base and underlayment hard surfaces. For plywood standard base type systems, a minimum of 8 in. of padding should be present. In both systems the padding should cover the entire area of the standard bases and all hard surfaces on which they rest. They should also minimally pad the entire area between the front buns and the adjacent base unit sections. Standard base protectors do not need to be covered with the common top pad or attached to the rest of the landing system. (See Figs. 5-7.)

3.9 Box collars are considered secondary (supplementary) padding. They are designed to pad the area between the outside edges of the vaulting box and the inside edges of the front buns. Box collars do not need to be covered with a common top cover. However, they should form fit exactly to the top of the outside edges of the planting box and extend beneath the landing pad front bun sections so that they are held in place by the weight of the front buns and yet remain adjustable. (See Fig. 3.)