



## Standard Specification for Shock Attenuation Properties of Fencing Surfaces<sup>1</sup>

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### 1. Scope

1.1 This specification covers shock absorption properties of fencing surfaces as measured by a drop test. The minimum performance standard for shock absorption is defined. Guidelines for other features and properties of fencing surfaces are described.

1.2 The values stated in SI units are to be regarded as the standard.

1.3 *This specification does not purport to address all the safety concerns, if any, associated with fencing surfaces and will not prevent all surface-related injuries. It is the responsibility of the user of the surfaces to establish appropriate safety and health practices, including, but not limited to, foot movement, footwear (shoes), and training practices.* Specific precautionary statements are given in Notes 4 and 5.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

E 105 Practice for Probability Sampling of Materials<sup>2</sup>

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *acceleration (deceleration)*—the instantaneous time rate of change of velocity. This is either positive (acceleration) or negative (deceleration).

3.1.2 *fencing surface*—the area for performing fencing bouts, competitions, or any other fencing exercises. A fencing surface, usually referred to as the fencing strip or piste, is defined in the U.S. Fencing Association's (USFA's) rule book.<sup>3</sup> It measures 1.8 to 2.0 m wide by 14 m long, often with added width and length for run-off, that at the ends should be 1.5 to 2 m. The fencing surface may be an area outlined by tape or paint on an existing surface or it may be a separate strip that can be placed on an existing surface, such as a rubber runner or a metallically-conducting mesh or sheet on a gym floor. This specification includes composite arrangements in which, for example, a grounded metallic strip is placed on top of a rubber

strip or other shock-absorbing layer, which, in turn, is placed on a permanent floor.

3.1.3 *g*—the acceleration of matter due to gravity at the surface of the earth.

3.1.4 *G*—the ratio of the magnitude of missile deceleration during impact to the acceleration of gravity, *g*. Hence, *G* values are dimensionless.

3.1.5 *G<sub>max</sub>*—the maximum value of *G* encountered during impact.

3.1.6 *G<sub>max(av)</sub>*—the arithmetic average of the set of *G<sub>max</sub>* values measured as stipulated in Section 5.

3.1.7 *shock attenuation*—the deceleration of an object upon impact on a surface or other object, measured in units of *g*.

3.1.8 *strip*—the fencing surface, defined in 3.1.2, above, is normally referred to as the strip (piste), in fencing.

### 4. Classification

#### 4.1 Types:

4.1.1 *Type I*—Concrete,

4.1.2 *Type II*—Covered concrete (for example, with linoleum tiles, or rubber runners),

4.1.3 *Type III*—Hardwood on concrete,

4.1.4 *Type IV*—Plywood on concrete,

4.1.5 *Type V*—Hardwood on floor joists,

4.1.6 *Type VI*—Plywood on hardwood,

4.1.7 *Type VII*—Raised plywood,

4.1.8 *Type VIII*—Other surfaces such as synthetic gym floors or recycled rubber composite,

4.1.9 *Type IX*—Rubber runners (strips) on various flooring types, except concrete, and

4.1.10 *Type X*—Copper or steel fencing strips on various flooring types, except concrete.

### 5. Performance Requirements and Test Method

5.1 *Shock Attenuation*—Fencing surfaces consisting of concrete alone, or concrete covered with conventional tile, or with sheet floor covering, or with thin vinyl, or rubber runners do not provide adequate shock absorption (Floor Types I through IV). To comply with this specification such surfaces shall not be used for the sport of fencing. It is not recommended that shock attenuation is enhanced by placing a rug under a metallic or rubber strip. While this reduces the *G* value, the shoe depresses the surface and creates a ridge around the shoe, causing increased risk of tripping.

5.1.1 Quantitatively, it is specified herein that the peak

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>3</sup> *Fencing Rules*, 1991 Edition, United States Fencing Association, Inc., One Olympic Plaza, Colorado Springs, CO 80909-5774.