Designation: F2970 – 15

Standard Practice for Design, Manufacture, Installation, Operation, Maintenance, Inspection and Major Modification of Trampoline Courts[1]

This standard is issued under the fixed designation F2970; 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 The purpose of this practice is to delineate requirements regarding the design, manufacture, installation, operation, maintenance, inspection and major modification of commercial or institutional trampoline courts with the primary purpose of amusement, entertainment or recreation.

1.2 This standard applies to institutional trampoline courts that are located in and around amusement, entertainment or recreational facilities. Such facilities include but are not limited to trampoline parks, amusement parks, theme parks, water parks, family entertainment centers, fitness centers, gyms, gymnastics facilities, sports facilities, skate parks, camps, shopping centers, temporary special events, carnivals and municipal parks.

1.3 This practice establishes guidelines that will provide a level of conformity for the purpose of reducing potential hazards to patrons, court attendants, and spectators.

1.4 This standard does not purport to address all of the hazards associated with institutional trampoline courts. The standard's existence alone will not prevent injuries. Like other physical activities, institutional trampoline court use involves the risk of injury, particularly if the equipment is used improperly or if users exceed their capabilities, endurance, training, or experience.

1.5 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.6 This practice includes an annex (mandatory), which provides additional information (for example, rationale, background, interpretations, drawings, commentary, and so forth) to improve the user's understanding and application of the criteria presented in this practice. The annex information shall be interpreted as mandatory criteria.

1.7 This practice includes an appendix (non-mandatory), which provides additional information (for example, rationale, background, interpretations, drawings, commentary, and so forth.) to improve the user's understanding and application of the criteria presented in this practice. The appendix information shall not be interpreted as mandatory criteria.

1.8 This standard includes the following sections:

1.9 *Units*—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.

1.10 *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]

D737 Test Method for Air Permeability of Textile Fabrics

[1] This practice is under the jurisdiction of ASTM Committee F24 on Amusement Rides and Devices and is the direct responsibility of Subcommittee F24.61 on Adventure Attractions.

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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.

D3574 Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams
D3786 Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method
D3787 Test Method for Bursting Strength of Textiles—Constant-Rate-of-Traverse (CRT) Ball Burst Test
D4533 Test Method for Trapezoid Tearing Strength of Geotextiles
D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles
D4833 Test Method for Index Puncture Resistance of Geomembranes and Related Products
D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
D5672 Test Method for Testing Flexible Cellular Materials Measurement of Indentation Force Deflection Using a 25-mm [1-in.] Deflection Technique
D6413 Test Method for Flame Resistance of Textiles (Vertical Test)
E84 Test Method for Surface Burning Characteristics of Building Materials
E648 Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
F355 Test Method for Impact Attenuation of Playing Surface Systems and Materials
F747 Terminology Relating to Amusement Rides and Devices
F770 Practice for Ownership, Operation, Maintenance, and Inspection of Amusement Rides and Devices
F1193 Practice for Quality, Manufacture, and Construction of Amusement Rides and Devices
F2291 Practice for Design of Amusement Rides and Devices
F2374 Practice for Design, Manufacture, Operation, and Maintenance of Inflatable Amusement Devices
F2375 Practice for Design, Manufacture, Installation and Testing of Climbing Nets and Netting/Mesh used in Amusement Rides, Devices, Play Areas and Attractions
F2650 Terminology Relating to Impact Testing of Sports Surfaces and Equipment

2.2 *AISC Manuals:*[3]

AISC 316 Manual on Steel Construction, Allowable Stress Design (ASD)
AISC M015 Manual on Steel Construction, Load & Resistance Factor Design (LRFD)

2.3 *AWS Standards:*[4]

ANSI/AWS D1.1/D1.1M Structural Welding Code—Steel
ANSI/AWS D14.4 Specification for Welded Joints in Machinery and Equipment

2.4 *NFPA Standards:*[5]

NFPA 70 National Electrical Code (NEC)
NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
NFPA 705 Recommended Practice for a Field Flame Test for Textiles and Films

2.5 *State Documents:*

California Technical Bulletin 117 Requirements, Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials
Title 19 California Code of Regulation, Flame Retardant Regulations[6]

3. Terminology

3.1 Reference Terminology F747.

3.2 Reference Terminology F2650.

3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *assembly area, n*—a designated area primarily used for mounting or dismounting the trampoline court.

3.3.2 *children zone, n*—a trampoline court, an area within a trampoline court, or an area adjacent to a trampoline court designated by the designer/engineer, manufacturer, or owner/operator primarily for use, activity, entry, or dismount by young children.

3.3.3 *court attendant, n*—individual trained in facility emergency procedures, familiar with fundamental trampolining and TC foam pit operations, monitoring patrons and responding to TC trampoline, and TC foam pit emergencies.

3.3.4 *dismount platform, n*—any surface for standing, walking, sitting, or climbing, or a flat surface larger than 2.0 in. (51 mm) wide by 2.0 in. (51 mm) long having less than 30° angle from horizontal.

3.3.5 *institutional trampoline, n*—a trampoline intended for use in a commercial or institutional facility.

3.3.6 *owner/operator, n*—person, entity or organization that is responsible for the maintenance and operation of a trampoline court.

3.3.7 *redundant barrier net, n*—net or mesh intended as secondary containment under or behind an elevated surface that helps passively contain the user(s) within the bounded area.

3.3.8 *suspension system, n*—bed-supporting system made up of elastic devices that connect the bed to the frame, for example, steel extension springs.

3.3.9 *trampoline court foam pit or TC foam pit, n*—a combination style dismount pit designed with a rebound device, covered with loose impact absorbing blocks.

3.3.10 *trampoline court trampoline or TC trampoline, n*—rebound device activated by vertical or lateral jumping used in a trampoline court.

3.3.11 *trampoline court bed or TC bed, n*—flexible surface which the user contacts in the course of bouncing on a trampoline.

3.3.12 *trampoline court or TC, n*—a defined area comprising one or more institutional trampolines or a series of institutional trampolines.

[3] Available from American Institute of Steel Construction (AISC), One E. Wacker Dr., Suite 700, Chicago, IL 60601-2001, http://www.aisc.org.
[4] Available from American Welding Society (AWS), 550 NW LeJeune Rd., Miami, FL 33126, http://www.aws.org.
[5] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.
[6] Available from Office of Administrative Law, 300 Capitol Mall, Suite 1250, Sacramento, CA 95814-4339, http://www.oal.ca.gov/Default.htm.

4. Significance and Use

4.1 This practice is intended to provide consistent criteria, references and operational considerations in the specifications, management and construction of institutional trampoline courts.

4.2 This practice is intended to be taken into consideration by architects, designers, engineers, construction contractors, manufacturers, appropriate inspectors, owners and operators who are involved with the design, construction, manufacture, installation, operation, maintenance, inspection or major modification of institutional trampoline courts.

4.3 This practice does not apply to consumer trampolines, trampolines intended for use on water, trampolines intended for use as aquatic play equipment, trampolines primarily used for professional exhibition, or single user trampolines primarily used under the direct supervision of a trainer or coach.

4.4 This standard does not apply to stand alone institutional trampoline units that consist of one or more individual stations with a total bed area less than 37 000 in.^{2} (238 709.2 cm^2) and employ a mechanical harnessed system to control or direct the descent of a patron.

4.5 This standard does not apply to stand alone institutional trampoline units that consist of one or more individual stations with a total bed area less than 37 000 in.^{2} (238 709.2 cm^2) and employ individual chambers divided with small mesh netting to control or direct the descent of a patron.

4.6 This standard does not apply to inflatable amusement devices covered by Practice F2374.

4.6.1 This standard applies to trampoline courts that mount or dismount onto an inflatable impact attenuation system.

4.7 Trampoline courts that employ a device designed to introduce additional energy into the suspension or bed system are outside the scope of this standard practice.

4.8 For the purpose of this standard, consideration shall be given within the design and for operation of a trampoline court with activities including but not limited to: bouncing, jumping, walking, standing, sitting, resting, acrobatic maneuvers, aerobics, flips, dancing, exercise, therapeutic rehabilitation, dodgeball, basketball, or volleyball.

4.9 For the purpose of this standard, consideration shall be given within the design and for operation of a trampoline court with complementary equipment including but not limited to: foam balls, inflated balls, foam toys, wakeboards, snowboards, bounce boards, hoops, nets, pylons, ropes, goals, harness systems, or inflated toys.

5. Quality, Manufacture, Construction and Installation

5.1 Quality, manufacture, construction and installation shall be in accordance with Practice F1193-06.

5.1.1 All components shall be installed as per designer/engineer and manufacturer specifications.

5.1.2 The installer shall verify that all components and equipment are functioning to the designer/engineer and manufacturer specifications.

5.1.3 Self-locking nuts shall fully engage with the bolt.

5.1.4 Hardware in moving joints shall be secured against unintentional loosening.

5.1.5 There shall be no accessible sharp points or edges on fasteners.

5.1.6 There shall be no accessible burrs, sharp points, or sharp edges on device frames.

5.1.7 The trampoline court shall be designed, built and installed such that no part of the frame, legs or ground can be contacted by the TC bed while bouncing.

5.1.8 The designer/engineer, manufacturer, constructor or installer of the trampoline court shall provide to the owner/operator clear and concise inspection, maintenance, and repair instructions, including, but not limited to, what, when, and how to inspect, maintain, and repair.

6. General Design

6.1 *Device Analysis:*

6.1.1 The designer/engineer or manufacturer shall perform a device analysis or risk assessment that shall include the following:

6.1.2 The device analysis or risk assessment shall specifically include an assessment of the suitability of the design of the device for the intended patrons, including anthropomorphic factors that relate age and physical size.

6.1.3 The device analysis or risk assessment shall identify the most significant factors that may affect patron safety and shall include mitigation for each factor.

6.1.4 The device analysis or risk assessment shall be documented listing the safety issues that were identified and the means used to mitigate each issue.

6.2 *Drawings and Records:*

6.2.1 The designer/engineer or manufacturer shall produce and retain applicable as-built drawings, calculations, and control software that depict the trampoline court or major modification details. These drawings and calculations shall be retained for a minimum of 20 years from the date of last manufacture. In the case of a major modification, all records must be retained for a minimum of 20 years.

6.2.2 Documents deemed proprietary and confidential by the manufacturer shall include a statement of such on each document. Use of the manufacturer's documentation and records should be limited, where possible, to the installation, maintenance, inspection, operation and design review of the trampoline court. All other dissemination should be limited.

6.2.3 Documentation supplied to the buyer, owner, or operator shall be complete and adequate for proper installation, maintenance, inspection, and operation of the trampoline court or major modification.

6.2.4 Drawings and documents shall illustrate and define all important dimensions and tolerances. Dimensions, tolerances, and other important characteristics shall be clearly depicted in appropriate views and cross sections. The following shall be included:

6.2.4.1 General drawings or diagrams in plan, elevation, and section views showing the general arrangement of components, including patron clearance envelope.

6.2.4.2 Assembly and subassembly drawings providing additional views of areas not clearly discernible from the general

drawings and providing clear identification and specification of all included components, their locations, and other information as applicable, for example, proper adjustment(s), fastener tightening specifications, descriptions of any other materials or lubricants used, and other important information.

6.2.4.3 Detailed drawings of all components specifically manufactured for use in the trampoline court or major modification.

6.3 *Regulatory Body Review:*

6.3.1 When the approval of a trampoline court, or major modification design is required by a regulatory authority, the following documents are typically made available for review:

6.3.1.1 General assembly drawings,

6.3.1.2 Facility interface drawings and related load calculations,

6.3.1.3 Operations, maintenance, and assembly instructions, and

6.3.1.4 Information otherwise called for in accordance with the guidelines in Practice F1193-06.

6.3.1.5 Use of the manufacturer's documentation and records should be limited to the regulatory approval process and dissemination shall be limited to minimize disclosure of proprietary and confidential documents.

6.4 *Patron Containment:*

6.4.1 The trampoline court shall be designed to support and contain the patron(s) during operation. This support and containment, that is, the patron containment, shall be consistent with the intended action of the trampoline court.

6.4.2 Parts of a trampoline court that patrons may reasonably be expected to contact shall be smooth; free from unprotected protruding studs, bolts, screws, sharp edges and corners, and rough or splintered surfaces; and considered for impact attenuation material as appropriate.

6.5 *Security of Patron Containment System:*

6.5.1 Any system or systems used to support and contain the patron(s) shall be securely fixed to the structure of the trampoline court or immediately adjacent structure and shall have adequate strength for the intended forces produced by the trampoline court and the reasonably foreseeable actions of the patron(s).

6.5.1.1 When an immediately adjacent wall is used for patron containment, the distance between TC frame and the wall shall not exceed 3 in. (7.62 cm).

6.6 *Loads and Strengths:*

6.6.1 The designer/engineer shall perform and document a risk analysis.

6.6.2 Trampoline courts shall be designed so that load conditions expected during operation shall not cause failures during the operational hours assumed in the analysis.

6.6.2.1 An exception to 6.6.2 may be made in the case of components and portions of structures that are intended to provide secondary load paths during a failure condition. Components such as safety cables or links and certain limited portions of the primary structure that they are attached to, may be designed to yield (and thus absorb a significant amount of energy) when subjected to load conditions expected to occur during a plausible, although unlikely primary structure failure scenario. In such cases, the expected failure mode loading shall not cause rupture to occur (that is, the stresses shall not exceed the ultimate strength). Designs that rely on such criteria shall utilize materials that possess high elongation for components where stresses may be expected to exceed the yield strength under failure mode loading conditions.

6.7 *Patron Weight:*

6.7.1 The weight assigned to an adult or child patron, for design purposes, shall be 170 lb (77.11 kg).

6.7.2 The designer/engineer may assign higher weight values for design purposes in accordance with the requirements of this standard practice.

6.7.3 As a nonfatigue, dynamic case, trampoline courts shall be designed for occasional full or partial loads of large adult participants weighing 300 pounds (136.08 kg) per participant or an appropriate lesser amount if recommended by the trampoline court manufacturer. This means that if an adult patron weighing 300 pounds (136.08 kg) is restricted from participation by signage or other means recommended by the manufacturer, then the trampoline court does not have to be designed to accommodate for occasional full or partial loads of large adult patrons weighing 300 pounds (136.08 kg). In this case, the trampoline court shall be designed to accommodate occasional full or partial loads of the heaviest adult patrons that the trampoline court is designed to accommodate.

6.8 Variable loads (that is, live load) for a trampoline court include all loads that fluctuate with respect to time. Variable loads are divided into four subsets: operational loads, nonoperational loads, environmental loads, operation in wind and non-operational in wind.

6.8.1 *Operational (Dynamic) Loads:*

6.8.1.1 Operational loads include varying loads normally encountered during operation of the trampoline court.

6.8.2 *Nonoperational Loads:*

6.8.2.1 All loads associated with transportation or handling or both (that is, setting up, tearing down) and ongoing maintenance of portable and permanent trampoline courts shall be considered in the analysis.

6.8.3 *Environmental Loads:*

6.8.3.1 Portable trampoline courts shall be designed to resist all designer/engineer defined environmental loads.

6.8.3.2 Fixed or permanent trampoline courts shall be designed to resist all applicable environmental loads for the intended location in accordance with the environmental loads in the applicable building codes for the intended location.

6.8.3.3 The designer/engineer shall clearly indicate the environmental loads the trampoline court was designed for, in the operating and maintenance instructions. Refer to Practice F1193-06. In addition to the environmental load information, any restrictions, limitations, or special procedures associated with trampoline courts exposed to these environmental loads shall be included.

6.8.4 *Operation in Wind:*

6.8.4.1 As a minimum, trampoline courts exposed to wind shall be designed to operate in winds up to 34 mph (15 m/s).

6.8.4.2 The designer/engineer or manufacturer shall include any restrictions, limitations, or special procedures for the operation of a trampoline court exposed to wind, in the

operating and maintenance instructions. See section on Manufacturer's Responsibility of Practice F1193-06.

6.8.5 *Nonoperational in Wind:*

6.8.5.1 The designer/engineer or manufacturer shall include any restrictions, limitations, or special procedures for nonoperating or out-of-service trampoline courts, and their associated components exposed to wind, in the operating and maintenance instructions. See section on Manufacturer's Responsibility of Practice F1193-06.

6.9 *Design:*

6.9.1 A structural analysis shall be performed for each trampoline court to verify that there is adequate structural capability in the design.

6.9.2 The type of calculation or analysis selected shall be a widely recognized and generally accepted engineering practice.

6.9.3 The structural analyses performed shall consider and incorporate all significant loads and identify all significant stresses and strains that are anticipated to be experienced by the trampoline court.

6.9.4 The required strength of the structure and its elements shall be demonstrated both statically and dynamically using a minimum of five times the weight of an adult patron per 6.7.1.

6.9.5 Structures shall be analyzed to verify that significant plastic deformation or collapse or both does not occur under any anticipated loading condition, consistent with the analysis expected to occur a limited number of times throughout the operational hours used in the design. Examples include environmental loads, patrons attempting to apply excessive (that is, abusive) loads, and extremely heavy patron weights.

6.9.6 A deflection analysis shall be performed if deformations in structural members or structural systems due to expected loading conditions could impair the serviceability of the structure.

6.9.7 The structural analysis for the trampoline court shall consider "strength" and "fatigue" criteria in the evaluation of stresses resulting from the application of loads. The number of times that a specific load or combination of loads is expected to occur throughout the designated number of operational hours for the trampoline court shall determine whether the resulting stress levels will be compared to strength or strength and fatigue material allowables. The method of analysis and load factors applied to specific loads shall be selected and based upon the number of times loads are expected to occur during the specified number of operational hours (that is, strength versus fatigue evaluation).

6.9.8 The yield and ultimate strengths and fatigue properties of the materials utilized for all components that could affect safety upon failure of the component shall be evaluated. Empirical testing, or empirical testing in combination with analysis, may be used as a means of evaluating the strength and fatigue properties of the materials for these components. If empirical testing is used for evaluation, the designer/engineer shall clearly specify and describe the testing procedure and refer to the section on Testing of Practice F1193-06.

7. Design

7.1 *Device Use Zone* (See Fig. 1):

7.1.1 Device use zone shall comprise the area from the ground surface underneath the TC beds to 204 in. (518.16 cm) above the ground surface. (See Fig. 1.)

7.1.2 The device use zone should be free from overhead obstructions including trusses, fire suppression systems, lighting, and duct work.

7.2 *Containment* (See Fig. 1):

7.2.1 The perimeter of a trampoline court or TC foam pit shall include a patron containment system.

7.2.2 Containment shall not be required within the assembly area(s), and within dismount zones protected by impact attenuation materials in accordance with this standard practice.

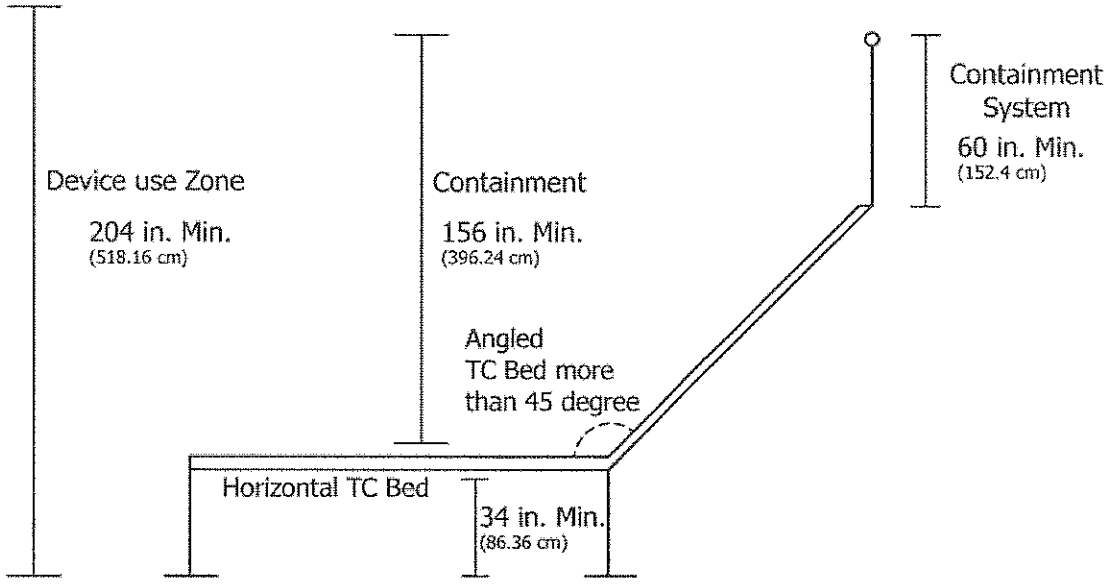

FIG. 1 Device Use Zone

7.2.3 The perimeter containment system shall be a minimum of 156 in. (396.24 cm) vertical height from the horizontal trampoline frame.

7.2.4 Angled TC trampoline frames with a slope of 45 degrees or more from the horizontal trampoline base frame shall be considered as a containment wall and included in the 156 inch (396.24 cm) vertical height calculation.

7.2.5 The minimum height of a containment wall above an angled TC trampoline frame with a slope of 45 degrees or more from the horizontal trampoline base frame shall be 60 in. (152.4 cm) vertical height.

7.2.6 Angled TC trampoline frames with a slope of 45 degrees or less from the horizontal trampoline base frame shall be considered as part of the horizontal base frame.

7.2.7 *Permanent Facility Wall*—When a permanent facility wall is used as part of the patron containment system, the wall shall be protected with impact attenuating foam up to a minimum of 96 in. (243.84 cm) from the horizontal trampoline frame.

7.2.8 *Tempered Glass Wall*—When a tempered glass wall is used as part of the patron containment system, the wall system holding or supporting the tempered glass should be designed to absorb impact energy as specified by the designer/engineer or manufacturer.

7.3 *Netting:*

7.3.1 Barrier/mesh netting systems shall comply with the requirements set forth in Practice F2375-09. The following instructions outline requirements as applicable to trampoline courts and include requirements not specified in Practice F2375-09 which are necessary and unique to trampoline courts.

7.3.2 No hold netting shall have a minimum breaking strength of 225 psi (15.51 bar) warp and 75 psi (5.17 bar) fill when tested in accordance with Test Method D5034.

7.3.3 No hold netting shall have a minimum bursting strength of 165 psi (11.38 bar) when tested in accordance with Test Method D3787.

7.3.4 Vertical barrier/mesh netting systems for perimeter containment or movable court dividers shall meet the requirements for no hold barrier net/mesh in accordance with the requirements set forth in Practice F2375-09.

7.3.5 Roof barrier net/mesh systems used for containment above courts shall meet the requirements for no hold barrier net/mesh or class 2 barrier net/mesh in accordance with the requirements set forth in Practice F2375-09.

7.3.6 Barrier net/mesh systems used underneath horizontal or behind angled trampoline beds as a redundant barrier system shall meet the requirements for redundant barrier nets or meet the requirements for a redundant TC bed that meets the requirements of this standard practice.

7.3.7 Netting material for structural purpose, containment or redundant barrier, used outdoors and subject to UV degradation, shall be protected from U/V exposure or include U/V degradation inhibitors.

7.3.8 Netting material for structural purpose, containment or redundant barrier used inside enclosed structures shall be flame resistant and meet or exceed requirements for Flame Resistance in accordance with NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

7.3.9 Netting systems shall be installed and maintained in accordance with the requirements set forth in Practice F2375-09.

7.3.10 Netting systems should be installed to prevent direct contact with obstructions located above, behind, or adjacent to the trampoline court.

7.3.10.1 In the event an obstruction located above, behind, or adjacent to a netting system can be contacted when direct force is applied, the obstruction must be protected by impact attenuation material.

7.3.11 Barrier net/mesh systems used as a vertical barrier system shall be installed so that patrons cannot contact any unprotected obstructions, suspension systems, frame components, unprotected surfaces or the unprotected floor surface when the highest anticipated live load is applied.

7.4 *Dismount Surface:*

7.4.1 Dismount surfaces incorporated into the design of a trampoline court shall be covered by impact attenuation materials as specified in this practice.

7.4.2 Dismount surfaces shall not be lower than 2 in. (5.08 cm) below the TC trampoline horizontal frame.

7.4.3 Dismount surfaces shall not be higher than 50 in. (127 cm) above the TC trampoline horizontal frame.

7.5 *Impact Attenuation Material:*

7.5.1 Materials used in any impact attenuation material, pad cover, frame padding, cover attachments, tie down(s), and pad seams used outdoors and subject to UV degradation shall be made from ultraviolet (UV) resistant materials.

7.5.2 Materials used in any impact attenuation material, pad cover, frame padding, cover attachments, tie down(s), and pad seams used inside enclosed structures shall be made from flame resistant materials that meet or exceed the requirements for Flame Resistance in accordance with Test Method E84 (flame spread index 75 or less, smoke developed index 450 or less), Test Method E648, California Technical Bulletin 117, NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

7.5.3 Except for necessary seams, the frame padding, where required, shall cover the top surface of the frame, be wide enough to completely cover the top surface of the suspension system including frame, and D rings at rest.

7.5.4 The impact attenuation materials shall be secured to the device frame.

7.5.5 The frame padding shall be of a color which contrasts with the color of the TC trampoline bed.

7.6 *Assembly Area* (See Fig. 2):

7.6.1 The primary assembly area shall be no more than ± 2 in. (5.08 cm) vertical from the top of the trampoline frame.

7.6.2 Obstructions such as fence, gates, barriers, queue lines, or benches should not be installed within assembly areas.

7.6.3 Barriers, fences, gates, hand rails, queue lines, seating, obstructions or platforms within an assembly area shall be protected with impact attenuation materials in accordance with this standard practice.

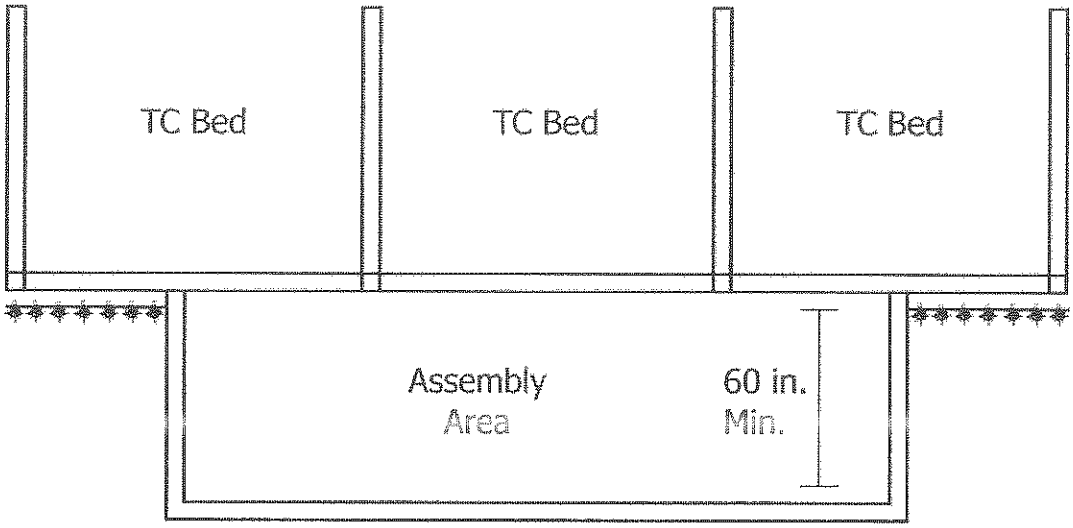

FIG. 2 Assembly Area

7.6.4 Obstructions that are installed within assembly areas shall be protected with impact attenuation materials in accordance with this standard practice.

7.6.5 Steps, ramps, barriers, queue lines or handrails that are installed within assembly areas shall be protected with impact attenuation materials in accordance with this standard practice.

7.6.6 Assembly areas incorporated into the design of a trampoline court shall be covered by impact attenuation materials as specified in this practice within 60 in. (152.4 cm) of the device frame in accordance with this standard practice.

7.6.7 Accessibility to trampoline courts shall conform to federal, state or local requirements for sports courts.

7.6.8 The transfer platform should be located adjacent to the assembly area.

7.6.9 Impact attenuation materials may be designed to allow removal in the event the transfer platform is located within the assembly area.

7.6.10 Impact attenuation material shall be of a color which contrasts with the color of the floor or platform surface.

7.6.11 Optional secondary assembly area(s) shall be no more than +50 in. (127 cm)/–2 in. (5.08 cm) vertical from the top of the trampoline frame.

7.6.11.1 Trampoline courts equipped with a secondary assembly area shall also be equipped with a primary assembly area equal to or greater in width than the secondary assembly area.

7.6.11.2 The manufacturer shall supply a means to restrict ingress when the secondary assembly area is not in use.

7.6.11.3 The leading 3 in. (7.62 cm) [+1 in. (2.54 cm)/–1 in. (2.54 cm)] of the change in elevation shall be differentiated with a contrasting color from the impact attenuation material.

7.7 *Obstructions:*

7.7.1 Obstructions within the trampoline court, assembly area or within 60 in. (152.4 cm) of the device frame at points of egress from the trampoline court shall be guarded or covered with impact attenuation materials in accordance with the provisions of this standard practice.

7.7.1.1 *Exceptions*—Emergency exit signage, strobe lights, alarm speakers, egress lighting required by state or local codes shall be guarded to prevent an impalement hazard to patrons while using the trampoline court.

7.7.1.2 Overhead obstructions within the device use zone shall be guarded or protected with impact attenuation material.

7.7.1.3 Obstructions located within the device use zone shall be guarded or protected with impact attenuation material.

7.8 *TC Foam Pits* (See Figs. 3 and 4):

7.8.1 TC foam pits used for the purpose of dismounting from a trampoline court shall meet or exceed the following minimum specifications:

7.8.2 *Length*—At least 228 in. (579.12 cm) in length from the leading edge of the TC frame prior to the addition of impact attenuation material and 12 in. (30.48 cm) from the leading edge of the trampoline bed at rest, or at least 240 in. (609.6 cm) in length from the leading edge of the TC frame prior to the addition of impact attenuation material.

7.8.2.1 *Exception*—If multiple horizontal or angled TC trampolines are positioned to allow dismount from various angles other than parallel, the minimum length shall be at least 240 in. (609.6 cm).

7.8.3 *Width*—At least 48 in. (121.92 cm) on each side of the TC trampoline prior to the addition of impact attenuation material.

7.8.3.1 *Exception*—If multiple TC trampolines are positioned parallel to each other, then the distance between any two shall be at least 96 in. (243.84 cm) from the center of the TC beds.

7.8.3.2 *Exception*—If multiple horizontal or angled TC trampolines are positioned to allow dismount from various angles other than parallel, the minimum width shall be at least 240 in. (609.6 cm).

7.8.4 *Depth*—At least 60 in. (152.4 cm) from the floor of the pit to the top of the TC frame prior to the addition of impact attenuation material.

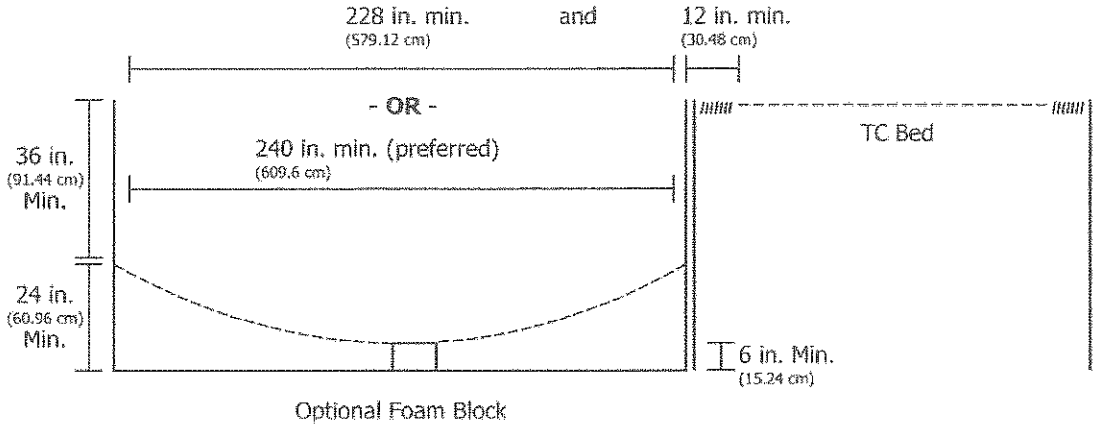

FIG. 3 TC Foam Pit Side View

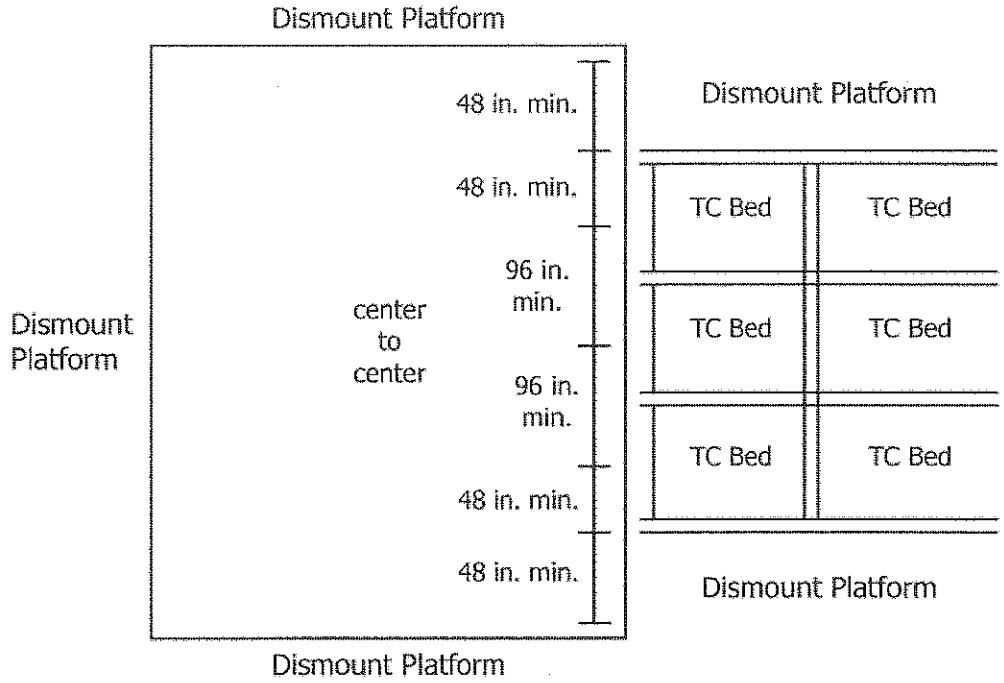

FIG. 4 Example TC Foam Pit Overview With Dismount Platforms

7.8.4.1 *Exception*—If multiple horizontal or angled TC trampolines are positioned to allow dismount from various angles other than parallel, the minimum depth shall be at least 72 in. (182.88 cm).

7.8.5 *TC Bed Mount*—The mounting device shall be positioned at least 24 in. (60.96 cm) above the TC foam pit floor and at least 36 in. (91.44 cm) below the top of the TC frame.

7.8.5.1 *Exception*—If multiple horizontal or angled TC trampolines are positioned to allow dismount from various angles other than parallel, the mounting device shall be positioned at least 24 in. (60.96 cm) above the TC foam pit floor and at least 48 in. (121.92 cm) below the top of the TC frame.

7.8.6 Angled TC trampolines shall not encroach on the minimum specifications for length, width or depth of the TC foam pit.

7.8.7 *Bed Sag*—When the TC foam pit is filled with impact absorbing blocks and at rest, the TC bed incorporated into the design must be at least 6 in. (15.24 cm) above the foam pit floor at the lowest point.

7.8.7.1 The engineer shall determine the maximum load for the TC bed incorporated into the TC foam pit design.

7.8.7.2 The designer, engineer, or manufacturer shall take into consideration the maximum weight of the foam cubes, anticipated user weight(s), environmental conditions for outdoor installations, and the associated impact into the TC foam pit from various heights of entry by the user(s).

7.8.7.3 The TC bed incorporated into the TC foam pit design shall be designed so that under maximum load the TC bed cannot make direct contact with the foam pit floor.

7.8.8 Impact attenuation block material may be installed underneath the TC bed incorporated into a TC foam pit in

accordance with manufacturer's specifications. The block impact material shall not contact more than 5% of the total TC bed surface when the TC foam pit is filled with impact attenuation blocks.

7.8.9 Impact attenuation material shall cover the suspension system and frame of the TC trampoline frame in accordance with the specifications in this standard practice.

7.8.10 Impact attenuation material shall cover the sides of the TC foam pit from the impact attenuation material covering the suspension system to the top of the adjacent TC trampoline frame and all inside walls, in accordance with the specifications in this practice.

7.8.10.1 *Exception*—In accordance with manufacturer's specifications, netting or small mesh material may not be covered with impact attenuation material.

7.8.11 If the side walls or back wall extend beyond the top of the TC trampoline frame, then the walls shall be covered with impact attenuation material to the top of the wall or an additional 60 in. (152.4 cm) above the TC trampoline frame, in accordance with the specifications in this standard practice.

7.8.11.1 *Exception*—In accordance with manufacturer's specifications, netting or small mesh material may not be covered with impact attenuation material.

7.8.12 The side and back containment walls of a TC foam pit should be constructed of a smooth material, no hold netting system, small mesh material system or angled TC trampoline in accordance with manufacturer's specifications.

7.8.13 If there is a dismount platform adjacent to the TC foam pit, the dismount platform shall be covered with impact attenuation material in accordance with the specifications in this standard practice.

7.8.14 The TC foam pit may be surrounded by any combination of dismount platforms, angled trampoline walls, horizontal trampolines, smooth walls or containment netting. (See Figs. 4 and 5.)

7.8.15 Impact attenuation block material shall be at least 216 $in.^3$ (3539.6 cm^3) configured in a cube or rectangular cuboid shape.

7.8.16 Impact attenuation block material shall meet the requirements for flame resistance in accordance with Test Method E84 (flame spread index 75 or less, smoke developed index 450 or less), Test Method E648, California Technical Bulletin 117, NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

7.8.17 Impact attenuation block material shall have an indentation force deflection rating between 25 and 50 in accordance with Test Method D3574 and manufacturer's specification or Test Method D5672 and manufacturer's specification.

7.8.18 Impact attenuation block material shall have a density weight rating between 1.2 and 1.7 lb (544.31 and 771.11 g) as per manufacturer's specification.

7.8.19 Impact attenuation block material shall not contain more than one-tenth of one percent (0.1 %) by mass of polybrominated diphenyl ethers (PBDE) including but not limited to the three primary forms of the commercial mixtures known as pentabromo diphenyl ether (penta-bde), octabromo diphenyl ether (octa-bde), and decabromo diphenyl ether (deca-bde).

7.8.20 A patron education sign(s) or label (s), indicating the TC foam pit depth specified by the manufacturer shall be displayed in the general vicinity of the TC foam pit. (See Appendix X4.)

7.8.20.1 The sign(s) or label(s) design, size, frequency and location should be specified by the manufacturer.

7.8.20.2 The TC foam pit depth specified by the manufacturer should be the vertical measurement from the top of the adjacent horizontal TC frame to the top of the TC foam pit bed mount ± 2 in. (5.08 cm).

7.8.21 A patron education sign(s) or label(s), containing guidance concerning diving or head first entry shall be displayed in the general vicinity of the TC foam pit. (See Appendix X4.)

7.8.21.1 The sign(s) or label(s) design, size, frequency and location should be specified by the manufacturer.

7.8.22 *Multiple Use TC Foam Pits:*

7.8.22.1 The designer/engineer or manufacturer shall specify any device, element, apparatus, interactive equipment or attraction that may be used by patrons to interact or dismount into a TC foam pit.

7.8.22.2 Examples include but are not limited to: slides, swings, bars, rings, ropes, goals, hoops, backboards, zip lines, aerial adventure courses, punching bags, pylons, balance

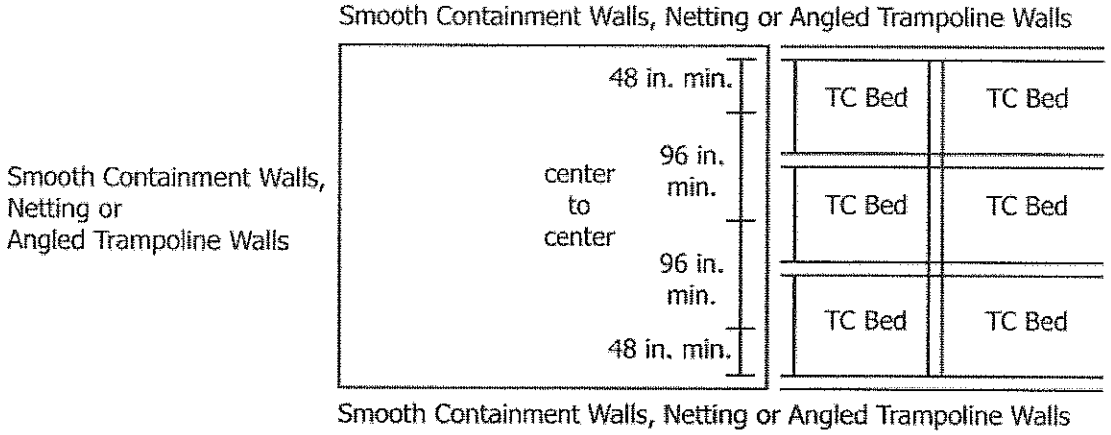

FIG. 5 Example TC Foam Pit Overview With Smooth Containment Walls, Netting or Angled Trampoline Walls

beams, targets, challenge courses, climbing walls, harness systems, pommel horses, trapeze equipment, spring floors, spring boards, and teeterboards.

7.8.22.3 The designer/engineer or manufacturer shall perform a device analysis or risk assessment that includes any device, element, apparatus, interactive equipment or attraction.

7.8.22.4 The designer/engineer or manufacturer shall take into consideration the anticipated landing area(s) for each TC bed, device, element, apparatus, interactive equipment or attraction and provide guidance for mitigating unintended patron contact with objects or other patrons.

7.8.22.5 The designer/engineer or manufacturer shall take into consideration the patron fall height for each device, element, apparatus, interactive equipment, or attraction.

7.8.22.6 The addition, removal, or relocation of a device, element, apparatus or attraction shall be considered a major modification in accordance with this standard practice.

7.9 *Frame:*

7.9.1 The TC trampoline shall be designed such that no part of the frame or legs can be contacted by the TC bed while bouncing.

7.9.2 *Steel Elements*—All exposed steel shall be inherently corrosion resistant or be provided with a corrosion resistant coating.

7.9.3 The frame system shall be able to withstand maximum permitted loads without permanent deformation to any elements in the system.

7.10 *TC Bed:*

7.10.1 TC beds consisting of at least 95% polypropylene fiber content that meet the requirements of this standard practice shall be used in the construction of trampoline courts.

7.10.2 Trampoline beds commonly referred to as string beds, aussie beds, canvas web beds, hot beds, or competition beds shall not be permitted in the design of a trampoline court.

7.10.3 Trampoline beds designated by the manufacturer for consumer use, residential use, for home use, not for commercial use or equivalent designation shall not be used in the design of a trampoline court.

7.10.4 Height of the TC bed from the ground or floor shall be sufficient to prevent the bed from contacting the ground or floor while bouncing.

7.10.4.1 The minimum TC bed height shall be the calculated bed height based on the maximum user weight (see X2.2) plus a 6 in. (15.24 cm) factor of safety or a minimum of 34 in. (86.36 cm) above the ground surface when the bed is at rest, whichever is greater. (See Fig. 1.)

7.10.4.2 *Exception*—TC beds used as an element in a TC Foam Pit shall meet the minimum height in accordance with 7.8 (TC Foam Pits) of this standard practice.

7.10.5 TC beds shall be designed and manufactured to withstand maximum permitted loads without permanent deformation or breakage while in normal operation.

7.10.6 TC beds shall have a minimum tensile strength of 525 psi (36.20 bar) warp and 420 psi (28.96 bar) fill when tested in accordance with Test Method D4632 (grab method).

7.10.7 TC beds shall have a minimum bursting strength of 760 psi (52.40 bar) when tested in accordance with Test Method D3786.

7.10.8 TC beds shall have a minimum tear strength of 190 lb (13.10 bar) warp and 165 lb (11.38 bar) fill when tested in accordance with Test Method D4533.

7.10.9 TC beds shall have a minimum puncture strength of 185 lb (12.76 bar) when tested in accordance with Test Method D4833.

7.10.10 TC Bed shall not allow more than 350 cubic feet of air per minute (CFM) to pass through the material when tested in accordance with Test Method D737.

7.10.11 TC beds used outdoors and subject to UV degradation, shall be protected from U/V exposure or include U/V degradation inhibitors.

7.10.12 The manufacturer shall permanently affix a unique identification tag or marking to each new TC bed manufactured after the date this practice is published. (See Appendix X2.)

7.10.12.1 The identification tag or marking shall include but not be limited to the following:

7.10.12.2 name of TC bed manufacturer,

7.10.12.3 country of origin (Example: Made in _____),

7.10.12.4 unique serial number,

7.10.12.5 date of manufacture,

7.10.12.6 rated for indoor or outdoor use.

7.10.12.7 The installer or maintenance technician shall note on the identification tag or manufacturers marking the date of installation.

7.10.12.8 The identification tag shall state the TC Bed was built in conformance with this standard practice.

7.10.12.9 The unique identification tag or marking requirement specified in 7.10.12 shall not apply to TC beds manufactured and installed on or before the publication date of this standard practice.

7.10.13 TC beds shall not be arranged in a stepped or riser configuration.

7.10.14 A redundant barrier system shall be deployed underneath and behind TC beds.

7.10.14.1 *Exception*—A redundant fall protection system shall not be required underneath TC Beds incorporated into the design of a TC foam pit box.

7.10.15 A redundant barrier system should be constructed from redundant barrier netting, a redundant or secondary TC bed in accordance with this standard practice and manufacturers specifications.

7.10.16 Barrier net/mesh systems used underneath horizontal and behind angled TC beds as a redundant barrier system shall meet the requirements for redundant barrier nets or meet the requirements for a TC bed in accordance with this standard practice.

7.10.16.1 Barrier net/mesh systems or secondary TC beds used underneath horizontal and behind angled TC beds as a redundant barrier system shall be installed so that patrons cannot contact any unprotected obstructions, suspension systems, frame components or the floor surface when the highest anticipated live load is applied.

7.10.16.2 Barrier net/mesh systems or secondary TC beds used underneath horizontal and behind angled TC beds as a redundant barrier system shall be installed no more than 18 in. (45.72 cm) below or behind the primary TC bed.

7.10.17 The rated capacity of a Trampoline Court shall not exceed 1 participant per 8640 in.^{2} (55 741.82 cm^2) based on the overall footprint of the Trampoline Court, excluding angled walls.

7.10.17.1 Footprint shall include but not be limited to: horizontal TC Beds, frames, rest areas, and dismount platforms.

7.11 *Suspension System:*

7.11.1 The suspension system shall be designed so that the ends of springs or the ends of an alternate system do not present an impalement hazard.

7.11.2 The suspension system shall be covered with impact attenuation material in accordance with this standard practice and manufacturer's specification.

7.11.3 The impact attenuation material shall cover the entire top surface of the frame and be wide enough to completely cover the entire top surface of the suspension system.

7.11.4 The impact attenuation material covering shall be a contrasting color to the TC beds.

7.11.5 The manufacturer shall devise a system to prevent direct contact with the suspension system during normal operation. The system shall be designed to withstand direct impact of the user's body without allowing any limbs or digits to penetrate.

7.12 *Patron Barriers* (See Fig. 6):

7.12.1 Trampoline courts shall comply with Practice F2291-11 Section 14, Fencing, Guardrails, Handrails, Gates, and Walkways for Amusement Rides and Devices.

7.12.2 For trampoline courts that feature an above grade suspension system, the accessible areas underneath the trampoline court shall be protected with a patron barrier in accordance with Practice F2291-11 Section 14.

7.12.3 Fencing or gates should not be positioned within the assembly area.

7.12.4 Barriers, fences and handrails should not protrude into a trampoline court or cause a hazard.

7.12.5 Netting or small mesh that meets the requirements for no hold netting is an acceptable alternative to fencing in areas that do not present a fall through exposure greater than 36 in. (91.44 cm) and are located within 60 in. (152.4 cm) of the trampoline court frame.

7.12.5.1 Netting or small mesh that meets the requirements for no hold netting and the requirements for Class 2 netting may be used in areas that present a fall through exposure greater than 36 in. (91.44 cm) and are located within 60 in. (152.4 cm) of the trampoline frame.

7.12.6 The design shall incorporate a patron barrier behind angled TC beds where patrons may come into contact with the underside of a TC Bed or suspension system. (See Fig. 6.)

7.12.6.1 Netting or small mesh that meets the requirements for no hold netting or Class 2 netting may be used as a patron barrier in areas where patrons may come in contact with the underneath side of a TC bed or suspension system.

7.13 *Fans:*

7.13.1 Fans located within or directly adjacent to the boundaries of the trampoline court, TC foam pit, dismount surface(s) or assembly area(s) shall be considered in the device analysis or risk assessment and appropriate mitigations shall be employed to prevent injurious contact with patrons.

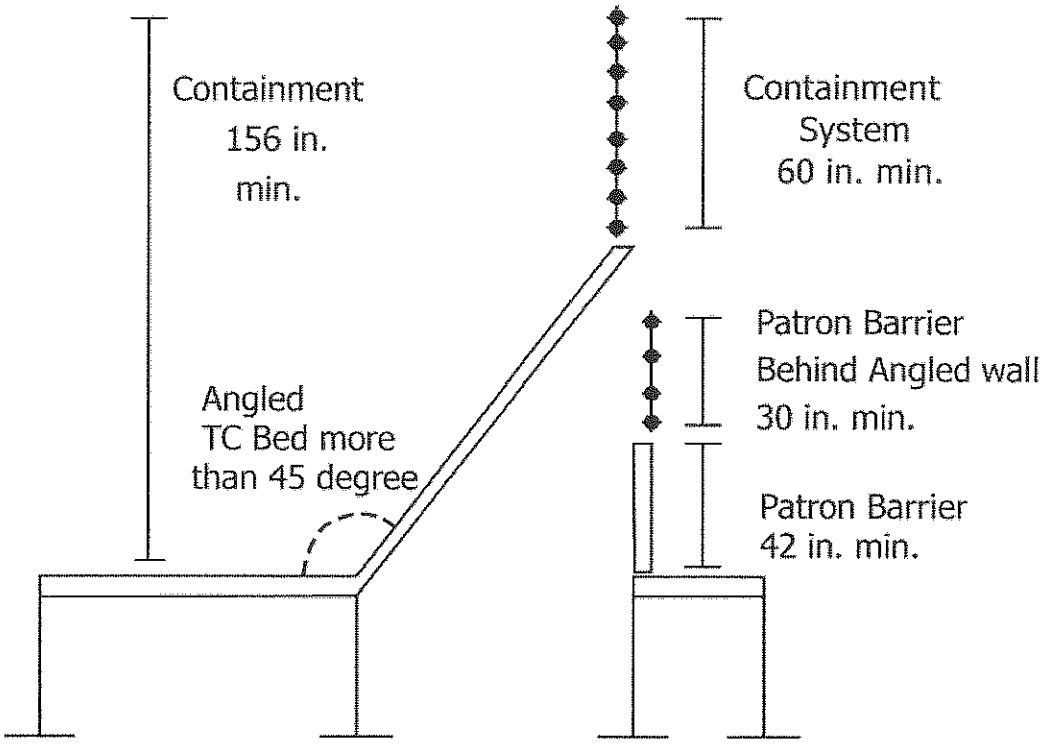

FIG. 6 Fencing and Patron Barrier

7.13.1.1 Mitigations employed may include but are not limited to guarding, location, or elevation to minimize probability of contact with patrons.

7.13.2 Ceiling mounted fans and fans located within the trampoline court perimeter area shall be securely mounted.

7.13.3 Ceiling mounted fans and fans located within the trampoline court perimeter should be installed in accordance with NFPA 70-NEC.

7.14 *Signage:*

7.14.1 Signage shall be placed by the owner/operator as specified in Practice F770-11. For trampoline courts, these signs shall include safety, warning, and instructional signage reflecting manufacturer recommendations. Signage shall be prominently displayed adjacent to the assembly area(s) or other appropriate area, or both.

7.14.2 The manufacturer shall determine and may make recommendations for appropriate advisory signs or warning signs based on the attributes of the trampoline court. These recommendations should be clear and concise, but are not intended to be the final wording of the signs that may be generated and displayed at the trampoline court.

7.15 *Electrical:*

7.15.1 Electrical systems should be installed in accordance with NFPA 70-NEC.

7.15.2 Electrical systems for portable trampoline courts should be installed in accordance with NFPA 70-NEC Article 525.

7.16 *Chain:*

7.16.1 Chain and related accessories shall be selected and designed for designer/engineer specified loads, corrosion, operating environmental and dynamic conditions, and for wear and fatigue.

7.16.2 Chain manufacturer's specifications shall include dimensions, strength, grade, and nominal breaking strength working load limit, and shall be included in the maintenance instructions.

7.16.3 The capacity of the chain and related accessories, for example, terminations, adapters, shall be verifiable either by certificates, manufacturer's markings, or testing.

7.16.4 Chains which directly support the load of a TC bed and that do not pass around sprockets or wheels shall have a minimum safety factor of three.

7.16.5 Chains which directly support the load of a TC bed and that pass around sprockets or wheels shall have a minimum safety factor of five.

7.16.6 The chain factor of safety is defined as the ultimate tensile strength of the chain divided by the maximum steady state tension.

7.16.7 The trampoline court manufacturer shall include in the maintenance instruction the method to measure chain wear and the maximum allowable change in pitch length.

7.16.8 Metallic chain guides shall be lined or appropriately protected.

7.16.9 The trampoline court manufacturer shall include cleaning and lubrication details in the maintenance instructions.

7.17 *Wire Rope (Excludes Fiber, Synthetic, Rope, Line and etc.):*

7.17.1 Wire rope can be used in systems such as: suspension, tension, counterweight, and so forth.

7.17.2 Wire rope consists of individual wires that are twisted into strands that form the rope.

7.17.3 Wire rope and wire rope accessories, for example, terminations, adapters, clamps, shall be designed for designer/engineer specified configuration, cycles, load(s), corrosion, dynamics, environment, wear, fatigue, and service conditions.

7.17.4 Wire rope and wire rope accessories which directly support the load of a TC bed shall have a minimum safety factor of five.

7.17.5 The wire rope factor of safety is defined as the ultimate tensile strength of the wire rope divided by the maximum steady state tension.

7.17.6 The capacity of the wire rope and related accessories, for example, terminations, adapters, shall be verifiable either by certificates, manufacturer's markings, or testing.

7.17.7 Wire rope systems shall be configured to minimize the forming of kinks or knots on any part of the wire rope system from normal use, and shall be designed to avoid excessive local stressing of individual elements. for example, individual wires or strands within the rope.

7.17.8 Where indicated by the device analysis, wire rope systems in operation should be configured so that operators and patrons are not exposed to hazards in the event that a wire rope fails (fractures, unravels, fatigue, and so forth, see Appendix X2, Fig. X2.1).

7.17.9 All splices shall be done according to the rope manufacturer's appropriate wire rope splice specifications.

7.17.10 A method shall be used to maintain proper rope contact with sheaves and pulleys.

7.17.11 For fatigue applications, the minimal sheave to rope diameter (D/d) shall be 30. The sheave diameter is D and the rope diameter is d. When space restraints preclude this ratio, then other mitigating factors should be considered such as more frequent in-service inspections or replacement criteria.

7.17.12 Where determined by the device analysis, sheave inertia must be considered in the design to minimize scuffing.

7.17.13 When determined by the device analysis, life cycle tests in accordance with OIPEEC standards shall be performed to validate rope fatigue and life calculations (see Appendix X2).

7.17.14 Wire rope guides shall be lined or appropriately protected.

7.17.15 The wire rope manufacturer shall recommend the type and frequency of lubrication and corrosion protection.

7.17.16 Ropes that have little or no motion, such as ropes in static tension systems, anchors, and guys, require special consideration for protection against corrosion.

7.18 *Rope (Includes, but not limited to Fiber, Synthetic, Rope, Line and etc.):*

7.18.1 The strength and application of rope, when used, shall be determined by the designer/engineer by applying standard structural engineering practice for expected dynamic, live and dead loads and uses materials that are applicable for the intended use.

7.18.2 Rope and rope accessories which directly support the load of a TC bed shall have a minimum safety factor of five.

7.18.3 The designer/engineer shall consider during the device analysis, the effects of the environment and wear on the primary load path materials, including but not limited to ultra-violet light, heat, and vermin.

7.19 *Welding:*

7.19.1 Welding procedures shall be in accordance with American National Standards Institute/American Welding Society (ANSI/AWS) or American Society of Mechanical Engineers (ASME), or equivalent standards.

7.19.2 For this section on Welding, equivalent standards are those that meet the ANSI/AWS and ASME welding process methodology. This methodology is outlined in the paragraphs below:

7.19.2.1 Full and complete information regarding location, type, size, effective weld length, and extent of all welds shall be clearly shown on the drawings.

7.19.2.2 Drawings and documentation shall clearly indicate by welding symbols or sketches the details of groove-welded joints and the preparation of material in making them. Special conditions shall be fully explained by added notes or details.

7.19.2.3 Welding process shall be performed in accordance with a written Weld Procedure Specification (WPS) that specifies the applicable essential variables in accordance with the criteria of the applicable code. The specific values for these WPS variables shall be obtained from the Procedure Qualification Record (PQR) Essential variables may include: weld process, joint design, base material, filler material, shielding, preheats, position, electrical characteristics, technique, and travel speed.

7.19.2.4 The WPS shall state the tolerances on an essential variable as indicated by the applicable standard.

7.19.2.5 A WPS shall be qualified in accordance with procedures indicated by the applicable standard and documented on the Procedure Qualification Record (PQR), which serves as written confirmation of a successful WPS qualification.

7.19.2.6 Only welders, welding operators, and tack welders who are qualified in accordance with the applicable standard shall perform welding. Welders, welding operators, and tack welders shall be qualified by testing as indicated by the applicable standard and documented on a Welding Performance Qualification Record (WPQR).

7.19.2.7 The welding personnel shall follow a WPS applicable to the qualification test.

7.19.2.8 The WPQR shall serve as written verification of welder qualification and shall list all applicable essential variables as indicated by the applicable standard (see Form E-1 in ANSI/AWS D1.1/D1.1M, Annex E).

7.19.2.9 Welding performance standards that do not have acceptance or workmanship criteria shall not be considered an equivalent standard.

7.19.3 *Welding Process Inspection:*

7.19.3.1 Inspectors must meet the criteria in accordance with the applicable standard. An inspector can be an engineer or technician who, by training or experience, or both, in metals fabrication, inspection, and testing, is competent to perform the inspection of the work.

7.19.3.2 The Inspector shall verify that all welds conform to the acceptance or workmanship criteria of the applicable standard, and to the drawings and documentation.

7.19.3.3 The size and contour of welds shall be measured with suitable gauges.

7.19.3.4 Visual inspection for cracks in welds and base metal and other discontinuities shall be aided by a strong light, magnifiers, or such other devices.

7.19.3.5 The Inspector shall verify that only materials conforming to the specifications contained within the drawings and documentation are used.

7.19.3.6 The Inspector shall review all WPSs used for the work and shall verify that the procedures conform to the criteria of the application standard.

7.19.3.7 The Inspector shall inspect the work on a sampling basis and at suitable intervals during the process to verify that the criteria of the applicable sections of the standard are met.

7.19.3.8 The Inspector shall inspect the welding equipment used for the work to verify that it conforms to the criteria of the applicable standard.

7.19.3.9 The Inspector shall verify that electrodes are used only in the positions and with the type of welding current and polarity for which they are classified.

7.19.3.10 The Inspector shall review for accuracy and applicability the record of qualifications of all welders, welding operators, and tack welders; all WPS qualifications or other tests that are made; and such other information as may be appropriate.

7.19.3.11 Records of the qualifications of all welders, welding operators, tack welders, WPS qualifications or other tests that are made, applicable inspections, and such other information as appropriate shall be maintained pursuant to the manufacturer's record retention policy and made available to those authorized to examine them.

7.20 *Metal Structures:*

7.20.1 *Suitability of Materials*—Only metals and metal alloys for which industry recognized data are available, indicating the physical capabilities including endurance limit or fatigue S/N curve, shall be used for structural elements in trampoline courts.

7.21 *Fasteners:*

7.21.1 *General:*

7.21.1.1 Fastened connections, that is, bolted, riveted, or other types as applicable, shall be designed in accordance with industry accepted engineering practices and standards, for example, AISC manual of steel construction, or other standards producing equivalent results in the country of manufacture.

7.21.1.2 Fasteners, for example, rivets, bolts, nuts and washers, shall be of a type meeting accepted engineering standards, ANSI, SAE, ASTM, ISO, EN, or other standards producing equivalent results in the country of manufacture.

7.21.1.3 All bolts, nuts, and washers used in the manufacture of trampoline courts shall be appropriately grade marked.

7.21.1.4 Information defining the exact specification, that is, type, material, strength, and finish for each fastener to be used in the device shall be clearly specified in the designer/ engineer documentation.

7.21.1.5 Through bolting is the preferred connection method for materials and equipment that is not welded. Items that cannot be through bolted or are not intended to be removed for service or maintenance may use other fastening methods, such as blind threaded holes, threaded inserts, and so forth if deemed appropriate by the designer/engineer.

7.21.1.6 Designing with threaded fasteners in shear should be avoided, where possible. Designs that place fasteners in shear shall be designed so that the fastener is in double shear wherever possible.

7.21.1.7 Fasteners tensioning information (dry or lubricated) shall be included in the Manufacturer provided drawings (for example, torque value or turn of nut).

7.21.1.8 Manufacturers shall determine all fastener information to be included in maintenance and inspection instructions.

7.21.1.9 SAE Grade 8 (ISO Grade 10.9) Fasteners that have been previously torqued to a value greater than 75 % of the ultimate strength should not be reused.

7.21.2 *Washers:*

7.21.2.1 Designs shall take into consideration the force under the head of a bolt or nut compared to the compressive yield strength of the clamped material.

7.21.2.2 Hardened flat washers shall be used under the heads of all bolts and nuts when fasteners SAE Grade 8 (ASTM A490, ISO Grade 10.9) and above where specified torque values are used.

7.21.2.3 Flange headed bolts and nuts may be used as an alternate to washers.

7.21.2.4 Designs utilizing oversized or slotted holes shall use appropriately sized (thickness and diameter) washers.

7.21.3 *Locking Systems:*

7.21.3.1 Locking spring type washers, for example, split, toothed, star, serrated, shall not be used with fasteners of strength grade levels, SAE Grade 5, ISO grade 8.8, or higher with specified torque values. Locking type bendable tab washers are acceptable.

7.21.3.2 The device analysis shall identify fasteners that require a means to visually verify that the fastener has not loosened since the last torque (that is, torque stripe, safety wire, torque tabs, etc.).

7.21.4 *Holes and Surfaces:*

7.21.4.1 Holes for fasteners shall be sufficiently perpendicular to the fastener bearing surfaces (bolt and nut) to avoid detrimental bending forces on the fastener. In cases where this is not possible, bearing surfaces for the fastener head and nut shall be made sufficiently perpendicular to the hole through the use of beveled washers or spot machining of the bearing surface(s) being clamped.

7.21.4.2 Material surfaces within the clamped grip, that is, fastener bearing surfaces and corresponding surfaces of all items being held together by the fastener, shall be free of burrs, foreign materials, and other substances that may prevent solid seating and reliable sustained clamping of the assembled parts when the fastener is tightened to the specified torque.

7.21.4.3 Consideration shall be given to the characteristics of the materials being clamped, for example, the possibility of cold flow or creep of plastics, paint, or other materials within the joint that might contribute to long-term relaxation.

7.22 *Stability:*

7.22.1 Portable trampoline courts shall be designed such that when erected and operated per the designer/engineer provided written instructions, the portable trampoline court is adequately stable and resistant to overturning. The designer/engineer shall take into consideration all worst case loading (for example, unbalanced loading, wind loading).

7.22.2 Within the manufacturer-provided written inspection instructions, the manufacturer shall specify how the stability of the portable trampoline court can be visually checked for acceptable settlement and level. This specific inspection instruction shall be specified to be performed after erection is completed and prior to the daily start of operation of the portable trampoline court at the installed location. This written inspection instruction shall describe how these measurements are to be assessed including the maximum amount of settlement and the maximum out-of-level tolerance allowable for trampoline court operation.

7.23 *Movable Systems:*

7.23.1 Any moveable system or device designed to temporarily encroach on the patron clearance envelope, that is, loading/unloading platforms, ramps, decks, or other devices, shall be designed in a fail-safe manner in order to prevent unintended contact.

7.23.1.1 Movable systems incorporated into the design of a trampoline court and stored within the patron containment envelope shall be protected by impact attenuation materials as specified in this practice.

7.24 *Inflatable Impact Attenuation Systems*—Inflatable impact attenuation systems used for the purpose of dismounting from a trampoline court shall meet or exceed the following minimum specifications:

7.24.1 An inflatable impact attenuation system may comprise one or more independent impact attenuation devices.

7.24.2 *Length*—At least 240 in. (609.6 cm) in length from the leading edge of the TC frame prior to the addition of impact attenuation material.

7.24.3 *Width*—At least 48 in. (121.92 cm) on each side of the TC trampoline prior to the addition of impact attenuation material.

7.24.3.1 *Exception*—If multiple TC trampolines are positioned parallel to each other, then the distance between any two shall be at least 96 in. (243.84 cm) from the center of the TC beds.

7.24.3.2 *Exception*—If multiple horizontal or angled TC trampolines are positioned to allow dismount from various angles other than parallel, the minimum width shall be at least 240 in. (609.6 cm).

7.24.4 *Depth*—At least 60 in. (152.4 cm) from the floor to the top of the TC frame prior to the addition of impact attenuation material.

7.24.4.1 *Exception*—If multiple horizontal or angled TC trampolines are positioned to allow dismount from various angles other than parallel, the minimum depth shall be at least 72 in. (182.88 cm).

7.24.4.2 *Exception*—If positioned on top of a TC foam pit trampoline bed installed in accordance with 7.8.5 – 7.8.8 of this practice, the minimum depth of the inflatable impact device shall be at least 48 in. (121.92 cm).

7.24.5 Angled TC trampolines shall not encroach on the minimum specifications for length, width or depth of the inflatable impact attenuation system(s).

7.24.6 *Impact Attenuation Material*—Impact attenuation material shall cover the exposed side walls, supports, hardware, and exposed floor surfaces adjacent to an inflatable impact attenuation system from the impact attenuation material covering the floor to the top of the adjacent TC trampoline frame and any inside walls, in accordance with the specifications in this practice.

7.24.6.1 *Exception*—In accordance with manufacturer's specifications, netting or small mesh material may not be covered with impact attenuation material.

7.24.6.2 Floor surfaces located directly underneath an inflatable impact attenuation device shall be covered by impact attenuation materials installed in accordance with the specifications in this practice or a TC foam pit trampoline bed installed in accordance with 7.8.5 – 7.8.8 of this practice.

7.24.6.3 Exposed floor surfaces and dismount platforms located within 60 in. (152.4 cm) of the inflatable impact attenuation device shall be covered with impact attenuation material in accordance with the specifications in this practice.

7.24.6.4 If there is a dismount platform adjacent to the TC foam pit, the dismount platform shall be covered with impact attenuation material in accordance with the specifications in this practice.

7.24.7 If the side walls or back wall extend beyond the top of the adjacent TC trampoline frame, then the walls shall be covered with impact attenuation material to the top of the wall or an additional 96 in. (243.8 cm) above the TC trampoline frame, in accordance with the specifications in this practice.

7.24.7.1 *Exception*—In accordance with manufacturer's specifications, netting or small mesh material may not be covered with impact attenuation material.

7.24.8 The recommended height of the adjacent surface intended for dismounting the inflatable impact attenuation system shall be determined by the manufacturer of the inflatable impact attenuation system.

7.24.9 The portion of the inflatable attenuation system dismount surface intended for use by patrons shall be designated by the designer/engineer or manufacturer.

7.24.9.1 The manufacturer shall characterize the patron use zone (landing area) with a marking, symbol, border, or other means as determined by the manufacturer.

7.24.10 The inflatable impact attenuation system dismount surface at rest shall not be lower than 2 in. (5.08 cm) below the adjacent TC trampoline horizontal frame(s).

7.24.11 The inflatable impact attenuation system dismount surface at rest shall not be higher than 9 in. (22 .9 cm) above the adjacent TC trampoline horizontal frame.

7.24.12 Inflatable impact attenuation systems shall be designed so that patrons cannot readily access space between the system and adjacent inflatable impact attenuation systems, dismount platforms, sidewalls, TC frames, or obstructions.

7.24.13 *Anchoring*—Inflatable impact attenuation system shall incorporate an anchorage system to minimize displacement during operation.

7.24.13.1 The engineer shall specify the number and strengths of anchorage points which take into account calculations for likely load conditions.

7.24.13.2 Anchoring systems for inflatable impact attenuation systems shall be fixed stationary objects, installed or weighted in accordance w th the manufacturers' recommendations.

7.24.14 *Inflation System*—Inflation system shall be positioned so that it will not impede the ingress/egress of the inflatable impact attenuation system.

7.24.14.1 The inflation system shall incorporate the use of an audible or visual alert system to notify the court attendant in the event of electrical power interruption.

7.24.15 *Flame Resistance*—Vinyl products used in the construction of an inflatable impact attenuation device shall meet the requirements for flame resistance in accordance with Test Method E84 (flame spread index 75 or less, smoke developed index 450 or less), Test Method E648, California Technical Bulletin 117, NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

7.24.16 *Barrier System*—The inflatable impact attenuation system shall incorporate the use of a patron barrier designed to limit access to the inflatable impact attenuation system or the adjacent trampoline court when the inflatable impact attenuation system is out of service.

7.24.16.1 The barrier system may be permanent, portable, or temporary in design.

7.24.16.2 When the design intent is to limit access to the inflatable impact attenuation system and the entire adjacent trampoline court, the barrier system shall comply with Practice F2291-11 Section 14, Fencing, Guardrails, Handrails, Gates, and Walkways for Amusement Rides and Devices.

7.24.16.3 When the design intent is to limit access to the inflatable impact attenuation system and allow continued operation of the adjacent trampoline court, the barrier system shall comply with the requirements for containment, utilizing netting or other suitable means in accordance with this practice.

7.24.17 *Existing Trampoline Courts*—Installation of an inflatable impact attenuation system adjacent to an existing trampoline court shall be considered a major modification in accordance with this practice.

7.24.18 *Patron Educational Signage*—The manufacturer of the inflatable impact attenuation system shall provide appropriate patron educational signage to the owner/operator.

7.24.18.1 Signage supplied by the manufacturer of the inflatable impact attenuation system shall be positioned by the owner/operator in a location visible to the patrons when entering the trampoline court.

7.24.18.2 The manufacturer of the inflatable impact attenuation system shall affix appropriate patron educational signage to the exterior vertical sidewalls of the inflatable impact attenuation device.

7.24.19 *Diving Signage*—A patron education sign(s) or label(s), containing guidance concerning diving or head first entry shall be displayed in the general vicinity of the TC foam pit. (See Appendix X4.)

7.24.19.1 The sign(s) or label(s) design, size, frequency, and location should be specified by the manufacturer of the inflatable impact attenuation system.

7.24.20 *Information Plate*—The manufacturer shall affix to the visible exterior sidewalls an information plate applicable to the inflatable impact attenuation system as specified in Section 9.

7.24.21 *Certifications*—The manufacturer of the inflatable impact attenuation system and the manufacturer of the trampoline court shall provide the following certifications unique to their product.

7.24.21.1 Prior to operation, the manufacturer of the inflatable impact attenuation system shall certify that the inflatable impact attenuation system meets the requirements set forth in Practice F2970.

7.24.21.2 Prior to operation, the designer, engineer or manufacturer of the adjacent trampoline court shall certify that the trampoline court may be utilized in tandem with an impact attenuation impact system manufactured in accordance with Practice F2970.

7.25 *Prohibited Devices:*

7.25.1 Trampoline rebound devices designated by the trampoline manufacturer for consumer use, residential use, for home use, not for commercial use or equivalent designation shall not be incorporated into the design of a trampoline court.

7.26 *Water and Wetting Agents:*

7.26.1 The designer/engineer or manufacturer shall not intentionally introduce water or wetting agents as part of the designed use of a trampoline court.

7.26.2 The owner/operator shall not intentionally introduce water or wetting agents as part of the operational use of a trampoline court.

8. Major Modification

8.1 *Major Modifications*—As specified in Terminology F747, major modifications shall not occur without written approval from the manufacturer.

8.1.1 In the event the manufacturer does not provide written approval for a major modification, the owner/operator may retain a different manufacturer or designer/engineer to complete or approve the major modification, or both.

9. Information Plate (see Appendix X3)

9.1 The information given in 9.2 shall be included, where applicable, on the information plate as specified in 9.2, and in the documented operating and maintenance instructions to be furnished by the manufacturer or seller at the time of sale of each trampoline court.

9.2 *Information Plate*—A manufacturer-issued information plate, printed in English, shall be permanently affixed to the trampoline court in a visible location, and shall be designed to remain legible for the expected life of the trampoline court. The plate shall include, but not be restricted to, all applicable items listed in 9.2.1 – 9.2.8.

9.2.1 *Serial Number*—A manufacturer-issued unique identifying number or code affixed to the trampoline court in a permanent fashion.

9.2.2 *Name and Manufacturer*—A manufacturer issued unique identifying trampoline court name, including the name of the manufacturer by city, state, and country.

9.2.3 *Model Number*—A manufacturer-issued unique identifying number or code assigned to each manufactured type of trampoline court having the same structural design or components.

9.2.4 *Date of Manufacture*—The date (month and year) determined by the manufacturer that the given trampoline court met his required construction specifications.

9.2.5 *Patron Capacity by Weight*—Maximum total patron weight per trampoline bed and per trampoline court.

9.2.6 *Patron Capacity by Number*—Maximum total number of adult or child patrons per trampoline bed and per trampoline court.

9.2.7 *Attendants*—Minimum number of attendants required when trampoline court is in operation or occupied by patrons.

9.2.8 *Country of Origin*—(Example: Made in _____).

9.3 The information plate shall state the trampoline court was built in conformance with this standard practice.

10. Information Requirements

10.1 The following instructions outline requirements under Practice F1193-06 as applicable to trampoline courts and include requirements not specified in Practice F1193-06 which are necessary and unique to trampoline courts. The designer, manufacturer, supplier, or installer shall supply to the owner, operator, purchaser, a qualified service technician authorized by the TC manufacturer, a qualified third-party trampoline court inspector, or requesting regulatory authority prior to shipment, the following information in accordance with Practice F1193-06.

10.1.1 *Operational Instructions*—Manufacturers of trampoline courts shall deliver to the owner/operator and make available to a qualified service technician authorized by the TC manufacturer, a qualified third-party trampoline court inspector, and regulatory bodies applicable documentation per Practice F1193-06, Sections 10 and 11.

10.1.2 *Maintenance Procedures*—Manufacturers of trampoline courts shall deliver to the owner/operator and make available to a qualified service technician authorized by the TC manufacturer, a qualified third-party trampoline court inspector, and regulatory bodies applicable documentation per Practice F1193-06, Section 13.

10.1.3 *Inspection Requirements*—Manufacturers of trampoline courts shall deliver to the owner/operator and make available to a qualified service technician authorized by the TC manufacturer, a qualified third-party trampoline court inspector, and regulatory bodies applicable documentation per Practice F1193-06 Section 15.

10.1.4 *Service Bulletins*—Manufacturers of trampoline courts shall deliver to the owner/operator and make available to a qualified service technician authorized by the TC manufacturer, a qualified third-party trampoline court inspector, and regulatory bodies supplemental notification bulletins in accordance with Practice F1193-06, Section 14.

11. Certifications

11.1 The following instructions outline requirements under Practice F1193-06 as applicable to trampoline courts and include requirements not specified in Practice F1193-06 which are necessary and unique to trampoline courts. The designer, manufacture, supplier, or installer shall supply to the owner, operator, purchaser or requesting regulatory authority prior to shipment, the following certifications in accordance with Practice F1193-06.

11.2 *Containment Net or Small Mesh Material:*

11.2.1 Certification that containment netting or small mesh material meets the requirements for no hold and class 2 netting in accordance with Practice F2375-09.

11.2.2 Certification that containment netting or small mesh material used inside enclosed structures meets the requirements for Flame Resistance in accordance with NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

11.2.3 Certification that containment netting or small mesh material is installed in accordance with Practice F2375-09 Section 8.

11.2.4 Certification that containment netting or small mesh material used outdoors and subject to UV degradation, has been treated with U/V degradation inhibitors and a representative sample has been tested and was found in accordance with this standard practice.

11.2.5 Certification that containment netting or small mesh material contains no more than 100 ppm of lead.

11.2.6 In the event the containment net or small mesh material is treated with paint or a surface coating, certification that the paint or surface coating contains no more than 90 ppm of lead.

11.3 *Redundant Barrier Netting:*

11.3.1 Certification that netting used for purposes of redundancy underneath horizontal beds or behind angled TC beds meets the requirements for redundant barrier netting.

11.3.2 Certification that redundant barrier netting used inside enclosed structures meets the requirements for Flame Resistance in accordance with NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

11.3.3 Certification that redundant barrier netting is installed in accordance with Practice F2375-09, Section 8.

11.3.4 Certification that redundant barrier netting used outdoors and subject to UV degradation, has been treated with U/V degradation inhibitors and a representative sample has been tested and was found in accordance with this standard practice.

11.3.5 Certification that redundant barrier netting contains no more than 100 ppm of lead.

11.3.6 In the event the redundant barrier netting is treated with paint or a surface coating, certification that the paint or surface coating contains no more than 90 ppm of lead.

11.4 *Impact Attenuation Material:*

11.4.1 Certification that impact attenuation material and covering material used inside enclosed structures meets the requirements for Flame Resistance in accordance with Test Method E84 (flame spread index 75 or less, smoke developed index 450 or less), Test Method E648, California Technical Bulletin 117, NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

11.4.2 Certification that impact attenuation material meets the performance criteria of this standard practice.

11.4.3 Certification that impact attenuation material and covering material contains no more than 100 ppm of lead.

11.4.4 In the event the impact attenuation material or covering material is treated with paint or a surface coating, certification that the paint or surface coating contains no more than 90 ppm of lead.

11.5 *TC Bed:*

11.5.1 Certification that the TC bed meets or exceeds the minimum requirements for puncture strength, tear strength, tensile strength, bursting strength, and CFM as set forth in this standard specification.

11.5.2 Certification that TC beds used outdoors and subject to UV degradation have been treated with U/V degradation inhibitors and a representative sample has been tested and was found in accordance with this standard practice.

11.5.3 Certification that TC bed contains no more than 100 ppm of lead.

11.5.4 In the event the TC bed is treated with paint or a surface coating, certification that the paint or surface coating contains no more than 90 ppm of lead.

11.6 *Trampoline Court:*

11.6.1 Certification that the trampoline court's design, quality, manufacturer, construction and installation are in conformance with Practice F1193-06, and this standard practice.

11.6.2 Upon completion of the trampoline court, and prior to allowing access by the general public, the manufacturer, a qualified service technician authorized by the TC manufacturer, or a qualified third-party trampoline court inspector contracted by the manufacturer shall inspect all components of the court for conformity with manufacturer's specifications using an inspection criteria developed by the manufacturer, and issue a certificate of inspection to the owners of the trampoline court.

11.7 *TC Foam Pit:*

11.7.1 Certification that the TC foam pit design, quality, manufacturer, construction and installation are in conformance with Practice F1193-06 , and the requirements of this practice.

11.7.2 Certification that the impact attenuation block material meets the requirements for flame resistance in accordance with Test Method E84 (flame spread index 75 or less, smoke developed index 450 or less), Test Method E648, California

Technical Bulletin 117, NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

11.7.3 Certification that the impact attenuation block material meets the performance criteria of this standard practice.

11.7.4 Certification that impact attenuation block material contains no more than 100 ppm of lead.

11.7.5 In the event the impact attenuation block material surface is treated with paint or a surface coating, certification that the paint or surface coating contains no more than 90 ppm of lead.

11.8 *Inflatable Impact Attenuation System:*

11.8.1 Certification that the Inflatable Impact Attenuation System design, quality, manufacturer, construction and installation are in conformance with Practice F1193-06, and the requirements of this practice.

11.8.2 Certification that the impact bag and cover meets the requirements for flame resistance in accordance with Test Method E84 (flame spread index 75 or less, smoke developed index 450 or less), Test Method E648, California Technical Bulletin 117, NFPA 701, NFPA 705, Title 19 California Code of Regulation Flame Retardant Regulations, or Test Method D6413.

11.8.3 Certification that the impact bag and cover contains no more than 100 ppm of lead.

11.8.4 In the event the impact bag or cover surface is treated with paint or a surface coating, certification that the paint or surface coating contains no more than 90 ppm of lead.

12. Performance Criteria

12.1 *Laboratory Testing of Impact Attenuation—New Materials:*

12.1.1 Impact attenuation materials used to cover the device frame, suspension system, and surfaces of TC Foam Pits (including but not limited to: frames, suspension system, walls, edges obstructions and adjacent dismount platforms) shall limit the g-max (peak acceleration) to less than an average of 100 when a representative sample is tested in accordance with Test Method F355 using a 20 lb (9.09 kg) flathead (Missile A) dropped from a distance of 39.4 +.39, –0 in. (100 +1, -0 cm).

12.1.2 Impact attenuation materials used to cover the assembly area, dismount platform, obstructions, overhead obstructions, ramps, steps and similar surfaces shall limit the g-max (peak acceleration) to less than an average of 100 when a representative sample is tested in accordance with Test Method F355 using a 20 lb (9.09 kg) flathead (Missile A) dropped from a distance of 39.4 +.39, –0 in. (100 +1, –0 cm).

12.1.3 Representative samples shall be tested on an iron anvil, or concrete substrate.

12.1.4 The testing positions for each sample shall be determined by the manufacturer.

12.1.5 Each sample shall be tested three times, with each drop being within five minutes of each other.

12.1.6 The temperature of the impact attenuation materials shall be 68° ± 18°F (20° ± 10°C).

12.1.7 Determine the average g-max score by averaging the g-max scores from the second and third drops.

12.2 *Field Testing of Impact Attenuation—In Service Materials:*

12.2.1 Impact attenuation materials used to cover the device frame, suspension system and surfaces of TC Foam Pits (including but not limited to: frames, suspension system, walls, edges, and obstructions) shall limit the g-max (peak acceleration) to less than an average of 180 when a representative sample is tested in accordance with Test Method F355 using a 20 lb (9.09 kg) flathead (Missile A) dropped from a distance of 39.4 +.39, –0 in. (100 +1, –0 cm).

12.2.1.1 Representative samples shall be removed from the device frame and tested on an iron anvil, concrete substrate, tile substrate or wooden substrate.

12.2.2 Impact attenuation materials used to cover the assembly area, dismount platform, obstructions, overhead obstructions, ramps, steps and similar surfaces shall limit the g-max (peak acceleration) to less than 180 when a representative sample is tested in accordance with Test Method F355 using a 20 lb (9.09 kg) flathead (Missile A) dropped from a distance of 39.4 +.39, –0 in. (100 +1, –0 cm).

12.2.2.1 Representative samples shall be tested on an iron anvil, concrete substrate, tile substrate or wooden substrate. Representative samples may be tested in place as determined by the manufacturer or owner/operator.

12.2.2.2 The testing positions for each sample shall be determined by the manufacturer or owner/operator.

12.2.2.3 Each sample shall be tested three times, with each drop being within 5 min of each other.

12.2.2.4 The temperature of the impact attenuation materials shall be 68 ± 18°F (20 ± 10°C).

12.2.2.5 Determine the average g-max score by averaging the g-max scores from the second and third drops.

12.3 *Laboratory Testing—UV Degradation:*

12.3.1 When designed for use outdoors and subject to UV degradation, the TC bed, netting or small mesh material, impact attenuation material, pad cover, frame padding, cover attachments, tie down(s), thread and pad seams shall be tested in accordance with ASTM G154-06.

12.3.1.1 The tested materials shall retain 90% or more of the pre-test strength properties at 5000 hours.

13. Classification of Injuries and Illnesses

13.1 The administration of emergency health care service and treatment should be recorded as deemed appropriate by the owner/operator of trampoline courts in accordance with F770-11 Section 8, Classification of Injuries and Illnesses.

14. Notification Requirement

14.1 Trampoline courts represented as complying with this practice shall meet all applicable requirements specified herein. Anyone representing compliance with this standard shall keep such essential records as are necessary to document any claim that the requirements within this standard have been met.

14.2 The owner/operator of a trampoline court shall notify the appropriate manufacturer(s) of any known incident as specified in Practice F770-11 Section 8.3.

14.3 The manufacturer shall notify the appropriate owner(s)/operator(s) of similar trampoline courts of an incident

that resulted in a serious injury promptly upon the determination by the manufacturer that the incident is significantly repeatable.

14.4 Such manufacturer notification shall be a bulletin as specified in Practice F1193-06, Section 14.

15. Manufacturer Responsibilities

15.1 The following instructions outline requirements under Practice F770-11 as applicable to trampoline courts and include requirements not specified in Practice F770-11 which are necessary and unique to trampoline courts. Manufacturers are responsible for determining the following:

15.2 Maximum total patron weight per trampoline bed and per trampoline court.

15.3 Maximum total number of adult or child patrons, per TC bed and per trampoline court.

15.4 Maximum number of patrons per trampoline bed or square footage of bed surface.

15.5 Minimum number of court attendants required when trampoline court is in operation or occupied by patrons.

15.6 Recommended warnings concerning forces and actions that could aggravate physical conditions such as preexisting medical conditions, circulatory conditions, heart or lung conditions, recent surgeries, back or neck conditions, high blood pressure, spine, musculoskeletal or head injury, pregnancy.

15.7 Specifications for inspection, maintenance and repair of the trampoline court that shall include, but not be limited to, the following:

15.7.1 A phone number, fax number, or email address to be used by the owner/operator to secure maintenance or operating assistance from the manufacturer.

15.7.2 Periodic minimum service and component inspection checklists.

15.7.3 Repair, replacement and patching instructions to include recommended methods and materials.

15.7.4 Recommendations for cleaning the trampoline court including but not limited to: TC beds, suspension system, frames, impact attenuation materials, netting, impact attenuation blocks, and TC foam pits.

15.7.4.1 Recommendations shall include but are not limited to: product recommendations, frequency, cleaning procedures, and biohazard mitigation.

15.7.5 Description of the recommended daily pre-opening inspection to be performed by court attendants, managers, or maintenance personnel, or a combination thereof, prior to daily operations should include but not be limited to:

15.7.5.1 Obstructions,

15.7.5.2 Condition of impact attenuation materials and covers,

15.7.5.3 Placement and securement of impact attenuation materials,

15.7.5.4 Condition of TC beds,

15.7.5.5 Condition of suspension system,

15.7.5.6 Condition of frame,

15.7.5.7 Condition of redundant bed or redundant barrier netting underneath or behind TC beds,

15.7.5.8 Condition of containment system and netting,

15.7.5.9 Condition of communications device if so equipped,

15.7.5.10 Condition and placement of signage,

15.7.5.11 Condition of TC foam pit if so equipped,

15.7.5.12 Level of impact attenuation block material, if so equipped,

15.7.5.13 Fluffing of impact attenuation block material, if so equipped,

15.7.5.14 Condition of nets, goals, hoops or other devices if so equipped,

15.7.5.15 Condition of balls, discs or other devices if so equipped,

15.7.5.16 Condition of footwear, if so equipped,

15.7.5.17 Condition of emergency response gear and first aid kits if so equipped,

15.7.5.18 Condition of assembly area,

15.7.5.19 Condition of adjacent platforms entrances, exits, stairways, lifts and ramps.

15.7.6 Recommendations for weather, wind, wet or damp locations.

16. Owner/Operator Responsibilities

16.1 As specified in Section 4 of Practice F770-11, the following instructions outline requirements as applicable to trampoline courts and include requirements not specified in Practice F770-11 which are necessary and unique to trampoline courts.

16.2 Each owner/operator shall have written operating procedures for the trampoline court, which are an integral part of their staff-training program. These procedures shall include but not be limited to:

16.2.1 Specific trampoline court operation policies and procedures with pertinent information from the manufacturer's instructions including operational and maintenance procedures.

16.2.2 Established time interval for each trampoline court.

16.2.3 Established communication system between court attendants if the trampoline court is staffed by two or more court attendants.

16.2.4 Procedures for limiting the number of patrons in the assembly area as required by the manufacturer and owners specifications.

16.3 The owner of the trampoline court shall verify and document that court attendants receive training in accordance with Practice F770-11 and this standard practice.

16.4 The owner of a trampoline court shall provide the appropriate number of court attendants, according to a minimum specified by the manufacturer, to effectively manage and monitor activities on the trampoline court during operations.

16.5 In deciding how many court attendants are required, the operator shall consider factors including but not limited to the following:

16.5.1 The manufacturer's recommendations or requirements,

16.5.2 The number of patrons using the trampoline court,

16.5.3 The age of patrons using the trampoline court,

16.5.4 The environment in which the trampoline court is located.

16.6 The minimum number of court attendants for a trampoline court in operation shall be no less than one.

16.7 The ratio of court attendants to active participants shall not exceed 1:32 at any time the trampoline court is in operation, excluding patrons within the assembly area or patrons located in designated rest areas.

16.8 Court attendants shall monitor activity on the trampoline court at all times during operation.

16.9 Court attendants shall incorporate the use of whistles or other devices or signal equipment and take appropriate action at the first sign of misbehavior or violation of posted rules.

16.10 The assembly area should be kept clear of onlookers, spectators or others not actively engaged in monitoring activity or preparing to mount or dismount the trampoline court so that the court attendant has a clear view and can verify that users are able to mount and dismount in accordance with procedures established by the owner/operator.

16.11 Patrons shall not be allowed to climb or hang on the walls or netting of a trampoline court unless the net or wall is designed for climbing.

16.12 Patrons shall not be allowed to sit or rest on TC beds, impact attenuation material surfaces, within dismount platforms, or within assembly areas.

16.12.1 Patrons should be allowed to sit or rest within designated rest areas.

16.13 Court attendants shall verify that the trampoline court is not overloaded with patrons in accordance with manufacturer's and owner's specifications.

16.14 The owner or operator of a trampoline court shall operate the device away from hazards in accordance with Practice F770-11.

16.15 The owner or operator of a portable trampoline court shall ensure the device is installed as per manufacturer's specifications prior to operation.

16.16 *Inspection and Maintenance Program*—Based on the trampoline court manufacturer's recommendations, each owner or operator shall implement a program of maintenance, testing, and inspection, providing for the duties and responsibilities necessary to care for the trampoline court, safety equipment, and the trampoline court facilities.

16.17 Trampoline court's components shall be cleaned and maintained per the manufacturer's recommendations.

16.18 Objects shall not be stored underneath or adjacent to TC beds that can interfere with the suspension system or movement of the trampoline bed.

16.19 Trampoline courts shall be operated in accordance with the manufacturer's recommendations for weather, wind, wet or damp locations.

16.20 Replacement parts for trampoline court equipment shall be:

16.20.1 Procured from the original manufacturer of the trampoline court equipment, using the appropriate manufacturer supplied identifying nomenclature; or

16.20.2 Procured or produced to meet or exceed the manufacturer's minimum specification.

16.21 The owner/operator of a trampoline court may deny entry to the device to any person, if in the opinion of the owner/operator the entry may cause above normal exposure to risk of discomfort or injury to the person who desires to enter, or if in the opinion of the owner/operator the entry may jeopardize the safety of other patrons or employees.

16.22 Trampoline court attendants should be given guidelines on the special considerations concerning patron size, and patrons with physical or mental disabilities or impairments, related to their particular device.

17. Patron Education (see Appendix X4)

17.1 Instructions, when required by the manufacturer, owner or operator concerning trampoline court rules shall be delivered to patrons prior to participation on the trampoline court.

17.2 Instructions may be delivered to patrons using video, audio, or computer based programs, prerecorded spiel, written document, signage, verbal instruction or other delivery method approved by the owner or operator.

17.3 The owner/operator shall convey to participants the substance of the patron responsibility requirements found in Section 18.

18. Patron Responsibility

18.1 As specified in Section 5 of Practice F770-11, the following instructions outline requirements as applicable to trampoline courts and include requirements not specified in Practice F770-11 which are necessary and unique to trampoline courts.

18.2 There are inherent risks in the participation in or on any trampoline court. Patrons of a trampoline court, by participation, accept the risks inherent in such participation of which the ordinary prudent person is or should be aware. Patrons have a duty to exercise good judgment and act in a responsible manner while using the trampoline court and to obey all oral or written warnings, or both, prior to or during participation, or both.

18.3 Patrons have a duty to not participate in or on any trampoline court when under the influence of drugs or alcohol.

18.4 Patrons have a duty to properly use all trampoline court safety equipment provided.

18.5 Patrons have a duty to not participate in or on any trampoline court if they have preexisting medical conditions, circulatory conditions, heart or lung conditions, recent surgeries, back or neck conditions, high blood pressure, any history of spine, musculoskeletal or head injury, or may be pregnant.

18.6 Patrons have a duty to remove inappropriate attire, including hard, sharp, or dangerous objects (such as buckles, pens, purses, badges, and so forth).

18.7 Patrons have a duty to avoid bodily contact with other patrons.

18.8 Patrons have a duty to conform with or meet height, weight, or age restrictions imposed by the manufacturer or owner to use or participate in the trampoline court activity.

18.9 Patrons have a duty to avoid crowding or overloading individual sections of the trampoline court.

18.10 Patrons have a duty to use the trampoline court within their own limitations, training and acquired skills.

18.11 Patrons have a duty to avoid landing on the head or neck. Serious injury, paralysis, or death, can occur even when landing on the TC bed.

19. Children Zones

19.1 The designer/engineer, manufacturer, or owner/operator of a trampoline court may designate a trampoline court, an area within a trampoline court, or an area adjacent to a trampoline court as a children zone.

19.2 *Multi-Zoned Devices*—The children zone should be separated from other zones by methods specified by the device designer/engineer, manufacturer, or owner/operator.

19.2.1 *Examples include but are not limited to:* Containment netting, facility walls, padding, dismount platforms, assembly areas, contrasting colored TC bed markings, contrasting colored impact attenuating materials, contrasting colored TC beds, designated trampoline(s), designated lane(s), pylons, signage, or other means specified by the device designer/engineer, manufacturer, or owner/operator.

19.3 Children zones may be permanent or temporary in nature depending on criteria established by the device designer/engineer, manufacturer, or owner/operator.

20. Keywords

20.1 aerobics; amusement device; basketball; children zone; construction; court attendant; design; dodgeball; family entertainment center; fitness center; foam pit; gym; gymnastics; inspection; institutional trampoline; jump center; maintenance; operation; recreational equipment; slam dunk; sports court; sports equipment; trampoline arena; trampoline court; trampoline equipment; trampoline park; volleyball

ANNEX

(Mandatory Information)

A1. RESERVED FOR FUTURE USE

A1.1 Reserved for future use.

APPENDIXES

(Nonmandatory Information)

X1. INTRODUCTION

X1.1 These appendixes have been added to propose a series of options or instructions that offer direction without recommending a definite course of action. The purpose is to offer guidance based on a consensus of viewpoints but not to establish a standard practice to follow in all cases. The intent is to increase the awareness of the user concerning available information within a given subject area, while providing information from which subsequent programs may be derived.

X2. DESIGN

Typical Examples of Wire Rope Deterioration

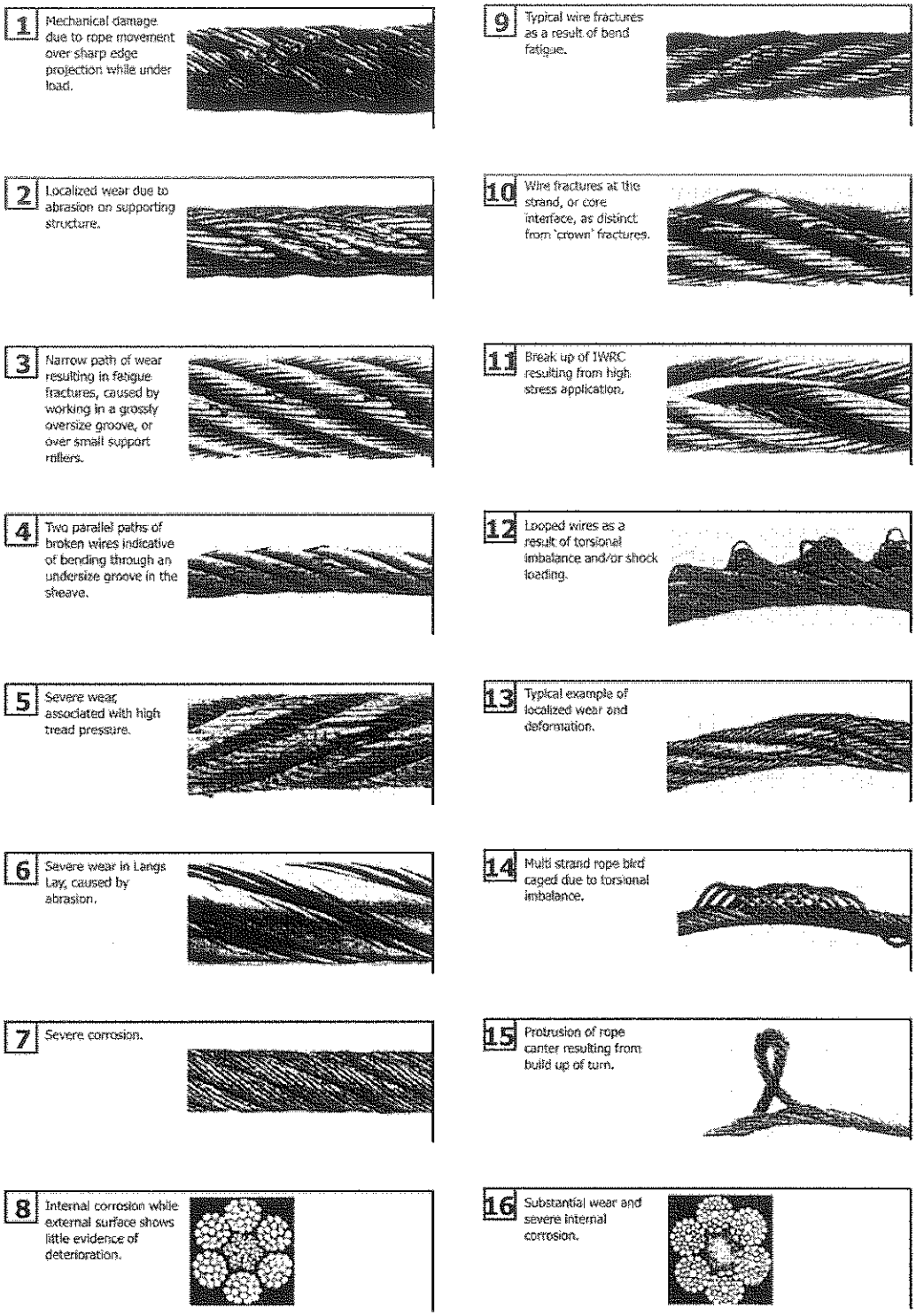

FIG. X2.1 Typical Examples of Wire Rope Deterioration

X2.1 Wire Rope

X2.1.1 *Section 13.3.10*—See Fig. X2.1, Typical Types of Wire Rope Deterioration.

X2.1.2 *Section 13.3.15*—OIPEEC is an international association of people with an interest in the endurance and other aspects of wire rope technology, including selection, degradation, inspection, and testing. Information is available at the following E-mail address: oipeec.com.

X2.2 Method to Determine Maximum User Weight

X2.2.1 *Background:*

X2.2.1.1 The safety risk for users near the upper limit of trampoline capacity is that the at-risk user will hit the ground and break a tailbone or ankle.

X2.2.1.2 Maximum user weight can be derived by equating the potential energy of the maximum-weight user doing (for example) a seat drop from an achievable height above the bed, to the potential energy in the bed-spring-air system required to just prevent ground contact, as in Fig. X2.2.

X2.2.1.3 It is reasonable to assume that a height of 5 ft (1.5 m) above the bed is unlikely to be achieved by a maximum-weight-user.

X2.2.1.4 The following equations result from the above assumptions:

Metric:

$$M = \frac{0.45(C\,J + C\,K - D\,K) + L}{g(h + C)} \qquad (X2.1)$$

Imperial:

$$M = \frac{0.45(C\,J + C\,K - D\,K) + L}{(h + C)} \qquad (X2.2)$$

Where the symbols can be found in Fig. X2.3, and in the list below:

M = maximum user weight,
C = trampoline bed height from the ground,
J = the bed upward force at bed deflection D,
K = the bed upward force when the deflection is C, (which is right to the ground),
D = the bed deflection about half of the full deflection (D = ½ C ± 2 in. or ± 50 mm),
L = the loss due to air in an impact from this height, (nominally 200 Joules or 150 ft.lbwt),
g = acceleration due to gravity (9.81 m/s^2 for metric case: not used for imperial case), and
h = the chosen drop height above the bed (1.5 m or 5 ft).

X2.2.2 *Method:*

X2.2.2.1 Determine which units to work in: metric or imperial.

X2.2.2.2 Measure the force J at D (half the bed height from ground).

X2.2.2.3 Measure the force K at full bed deflection, C (just touching the ground).

X2.2.2.4 Enter values into the equation.

X2.2.2.5 Calculate the Maximum User Weight M.

X2.2.3 *Metric Example:* C: Trampoline bed height from the ground, C = 0.869 m

K: At full bed deflection C, the upwards force = 887 kg × 9.81 to give K = 8705 N

D: The approximate half-height measurement was at D = 0.465 m

J: The bed upward force J measured at D, was J = 255 kg × 9.81 to give 2500 N

g: g = 9.81 m/s

H: Assuming h = 1.5 m from above, and

L: L = 200 J from above

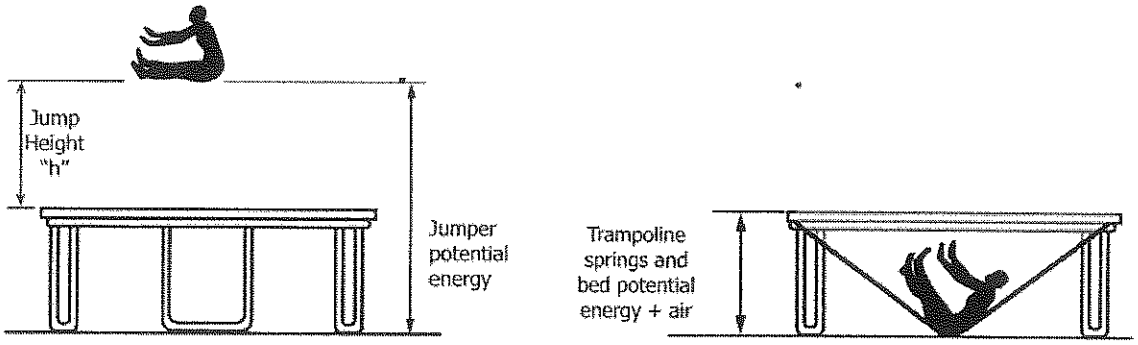

FIG. X2.2 The Two Conditions of Potential Energy

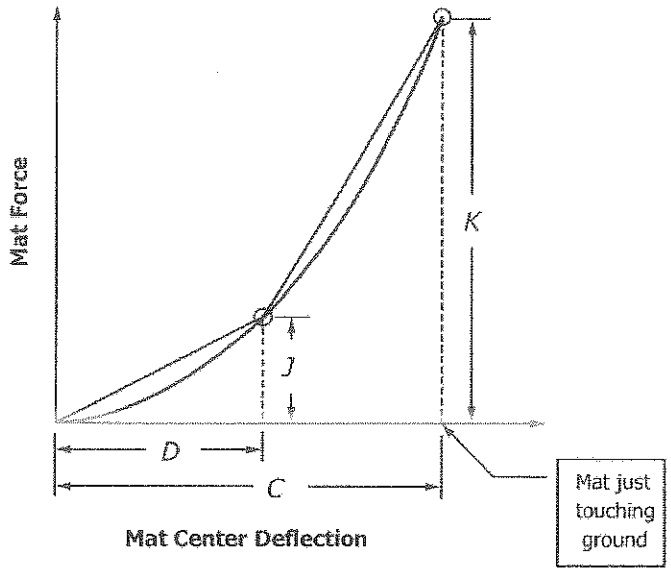

FIG. X2.3 Trampoline Force-Deflection Curve With Measurement Points and Equation Variables

$$M = \frac{0.45(0.869 \times 2500 + 0.869 \times 8705 - 0.465 \times 8705) + 200}{9.81(1.5 + 0.869)} \quad \text{(X2.3)}$$

Giving M = 119 kg.

X2.2.3.1 This means a person of this weight doing a seat drop from 1.5 m above the bed on this trampoline would just touch the ground. It is recommended to specify a maximum user weight under this value.

X2.2.4 *Imperial Example:* (same trampoline as above)

C: Trampoline bed height from the ground, C = 2.85 ft

K: At full bed deflection C, the upwards force K = 1951 lbwt

D: The approximate half-height measurement was at D = 1.53 ft

J: The bed upward force J measured at D, was J = 561 lbwt

g: g is not used in the imperial case (because it is taken account of in the loads)

H: Assuming h = 4.92 ft from above, and

L: L = 150 ft.lbwt from above

$$M = \frac{0.45(2.85 \times 561 + 2.85 \times 1951 - 1.53 \times 1951) + 150}{(4.92 + 2.85)} \quad \text{(X2.4)}$$

Giving M = 261 lbwt.

X2.2.4.1 This means a person of this weight doing a seat drop from 4 ft 11 in. above the bed on this trampoline would just touch the ground. It is recommended to specify a maximum user weight under this value.

X2.3 Sample Bed Identification Tag

X2.3.1 See Fig. X2.4.

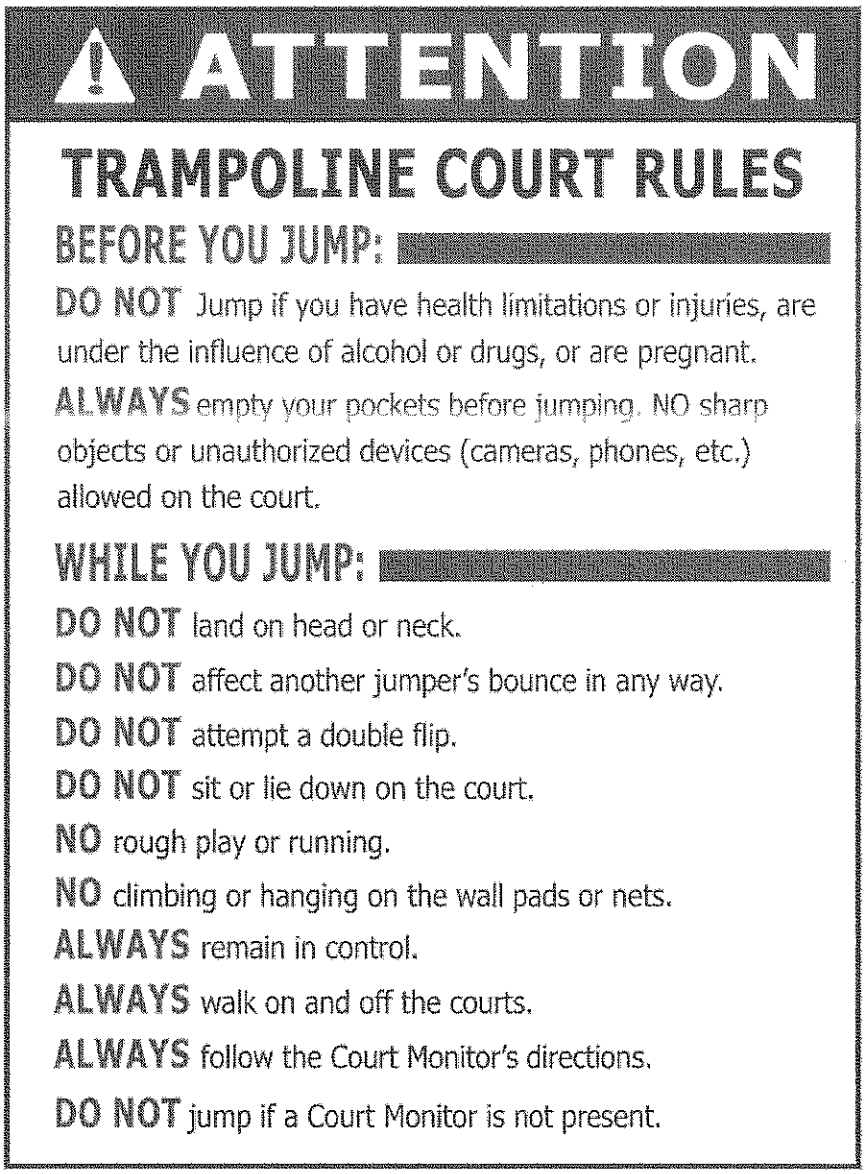

FIG. X4.1 Sample Trampoline Court Rules Sign

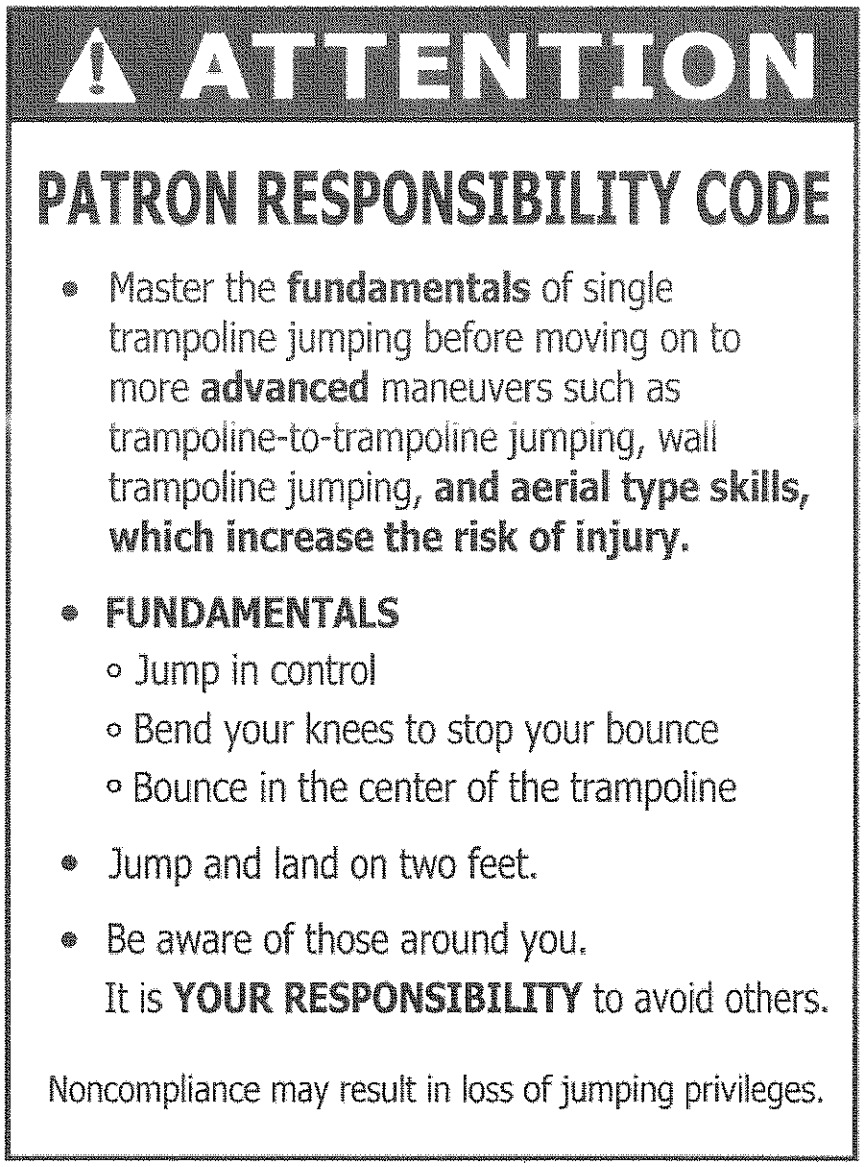

FIG. X4.2 Sample Trampoline Court Patron Responsibility Code Sign

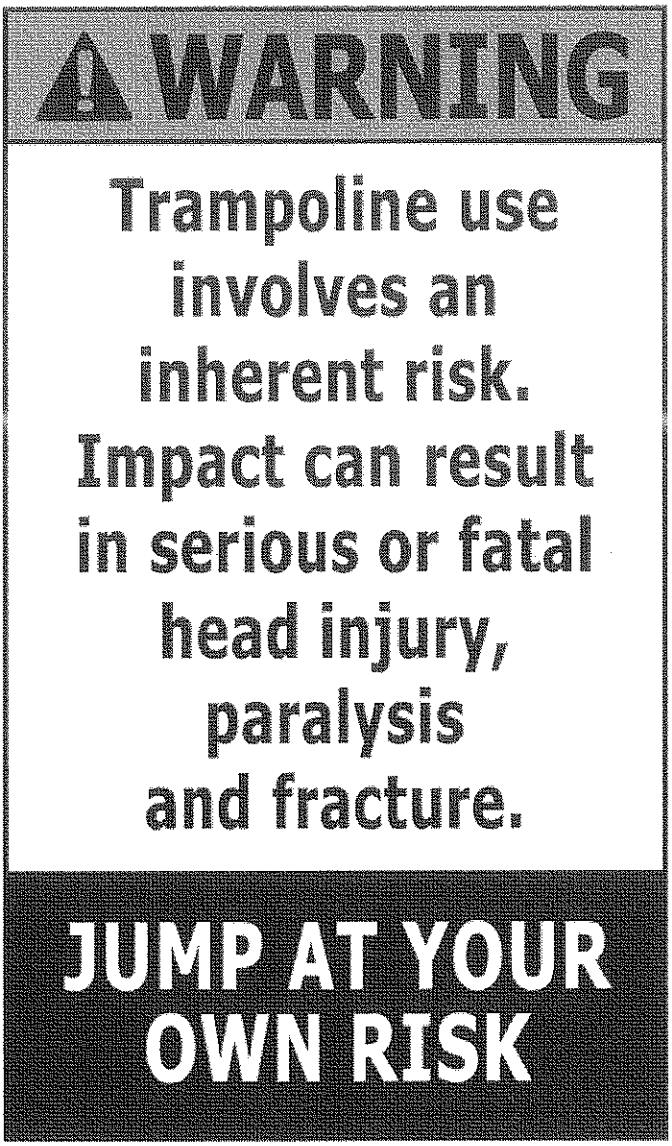

FIG. X4.3 Sample General Warning Sign

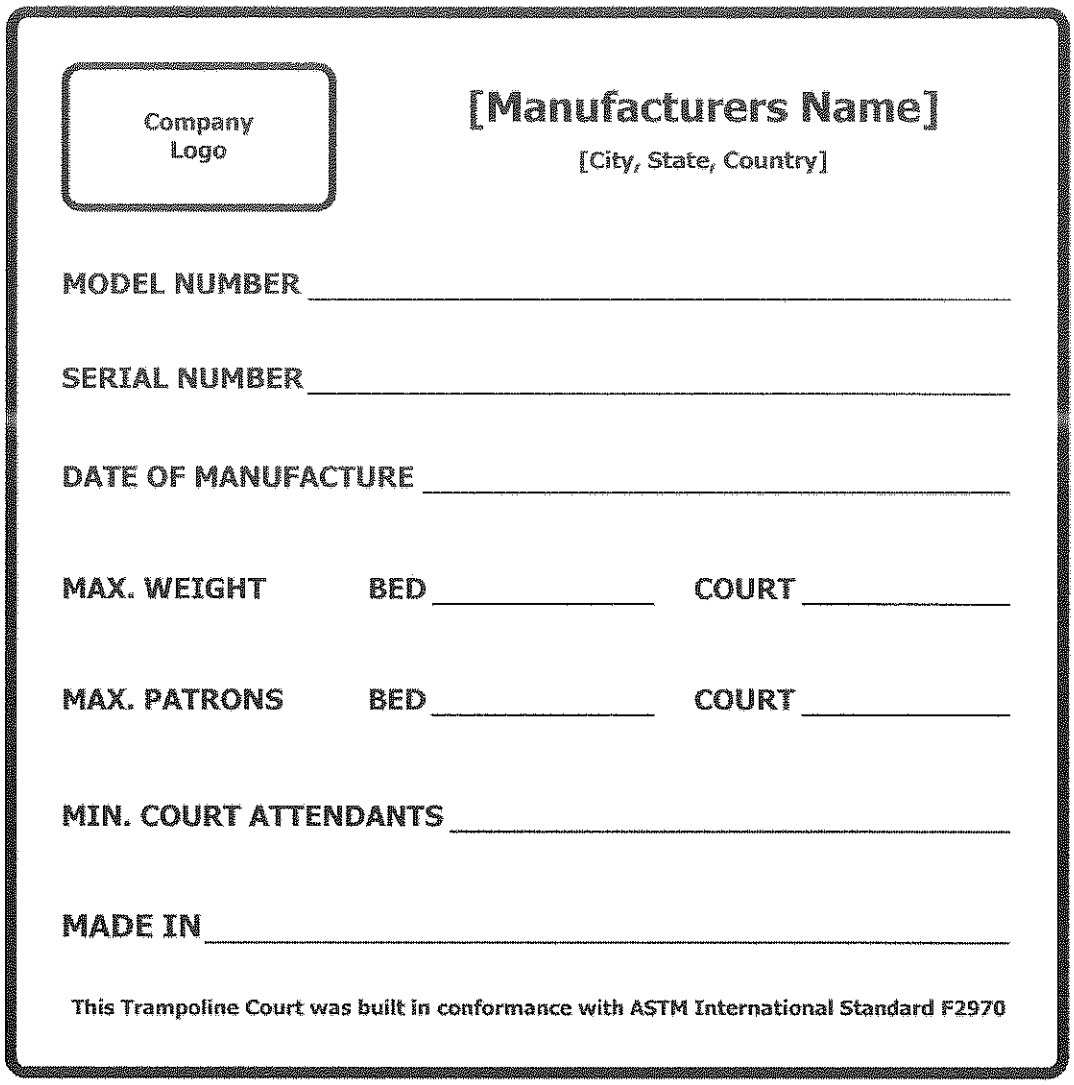

FIG. X3.1 Sample Information Plate

X4. PATRON EDUCATION

X4.1 Sample Trampoline Court Rules Sign

X4.1.1 See Fig. X4.1.

X4.2 Sample Trampoline Court Patron Responsibility Code Sign

X4.2.1 See Fig. X4.2.

X4.3 Sample General Warning Sign

X4.3.1 See Fig. X4.3.

X4.4 Sample Foam Pit Rules Sign

X4.4.1 See Fig. X4.4.

X4.5 Sample Foam Pit Patron Responsibility Code Sign

X4.5.1 See Fig. X4.5.

X4.6 Sample Foam Pit Depth Sign or Label

X4.6.1 See Fig. X4.6.

X4.7 Sample Foam Pit No Diving Sign or Label

X4.7.1 See Fig. X4.7.

FIG. X4.4 Sample Foam Pit Rules Sign

FIG. X4.5 Sample Foam Pit Patron Responsibility Code Sign

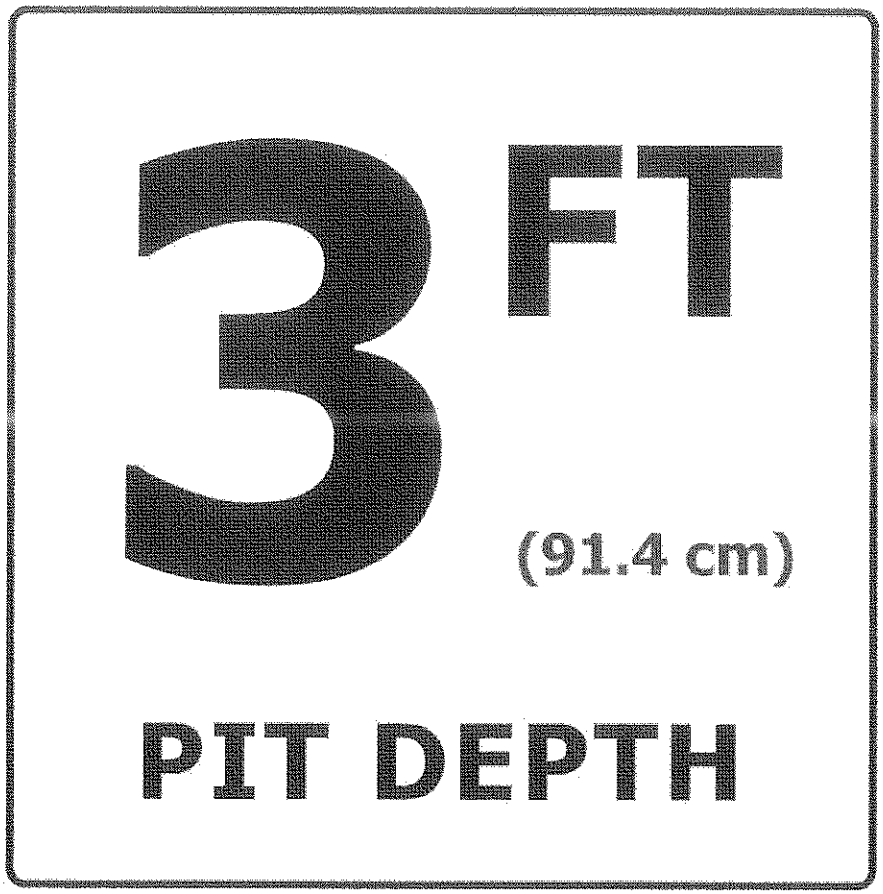

FIG. X4.6 Sample Foam Pit Depth Sign or Label

FIG. X4.7 Sample Foam Pit No Diving Sign or Label

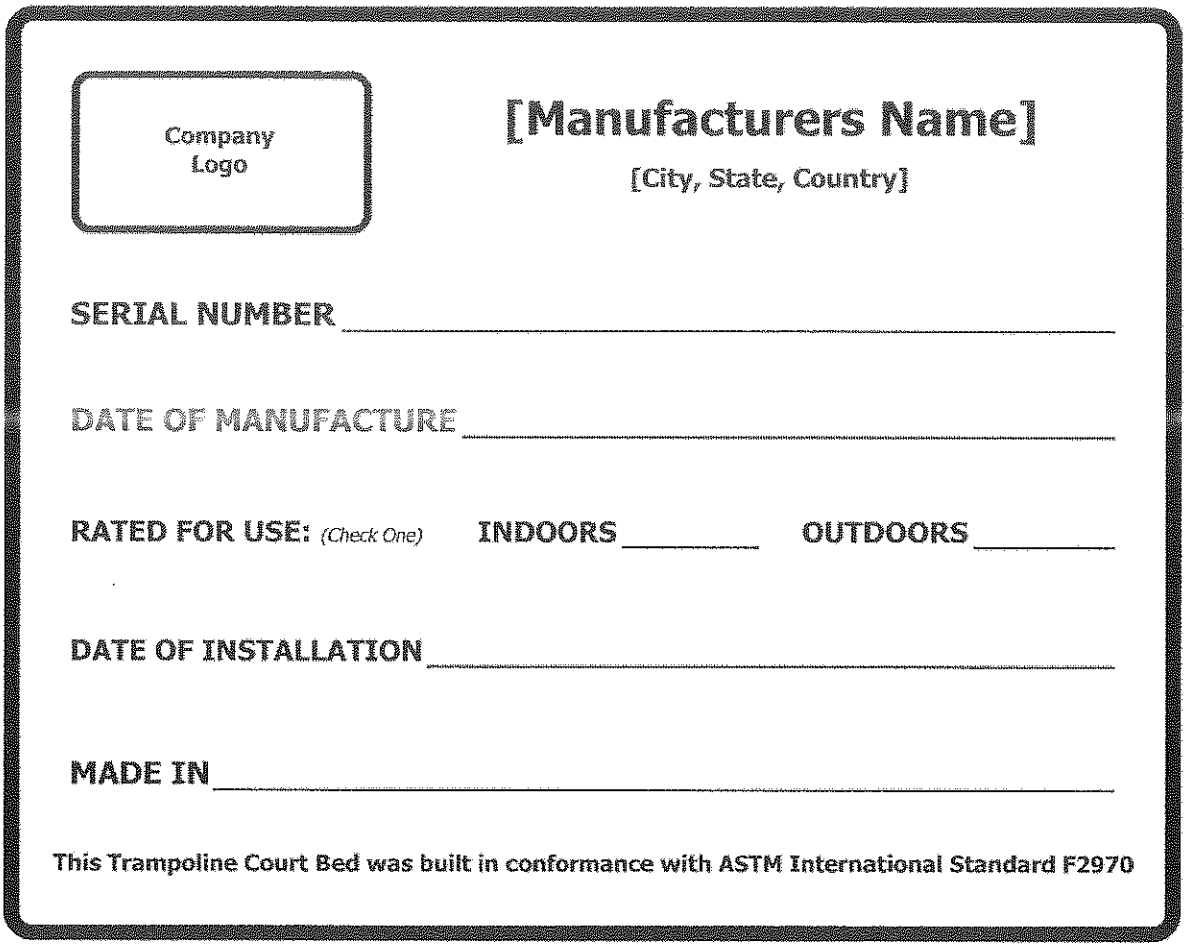

FIG. X2.4 Sample Bed Identification Tag

X3. INFORMATION PLATE

X3.1 Sample Information Plate

X3.1.1 See Fig. X3.1.