This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: F2970 – 22

# 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 standard applies to devices manufactured on or after the date of publication of this standard practice.

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

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 This standard includes the following sections:


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1.10 *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.

1.11 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.12 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

[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. Referenced Documents

2.1 *ASTM Standards:*[2]

D737 Test Method for Air Permeability of Textile Fabrics

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, Other Protective Sport Systems, and Materials Used for Athletics, Recreation and Play

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 *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.

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

3.3.8 *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.

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

[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.

[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.

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

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

## 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,

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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,

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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.)

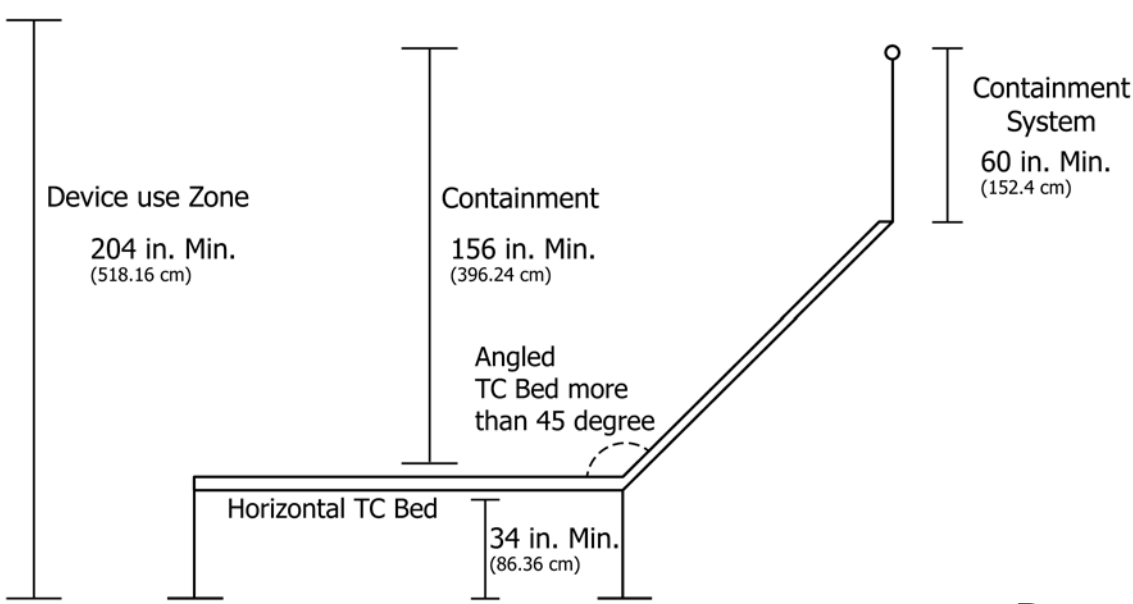


FIG. 1 Device Use Zone



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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.

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 or exceed 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 or exceed the requirements for no hold barrier net/mesh or class 1 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 or exceed the requirements for class 2 barrier nets in accordance with the requirements set forth in Practice F2375-09 or meet or exceed the requirements for a redundant TC bed that meets or exceeds the requirements of this standard practice.

7.3.7 Netting material for structural purpose, containment or redundant barrier system, 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.

7.4.4 Dismount surfaces shall be contained within the device use zone.

7.4.5 Dismount surfaces shall not be available as a means of ingress or egress to the device use zone.

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.

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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.

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 ±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.

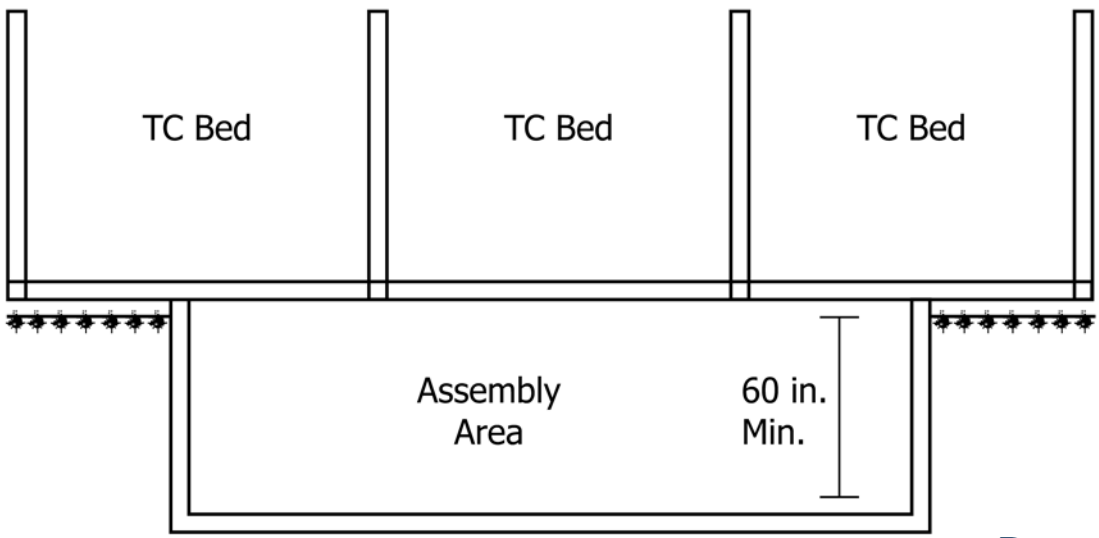


FIG. 2 Assembly Area

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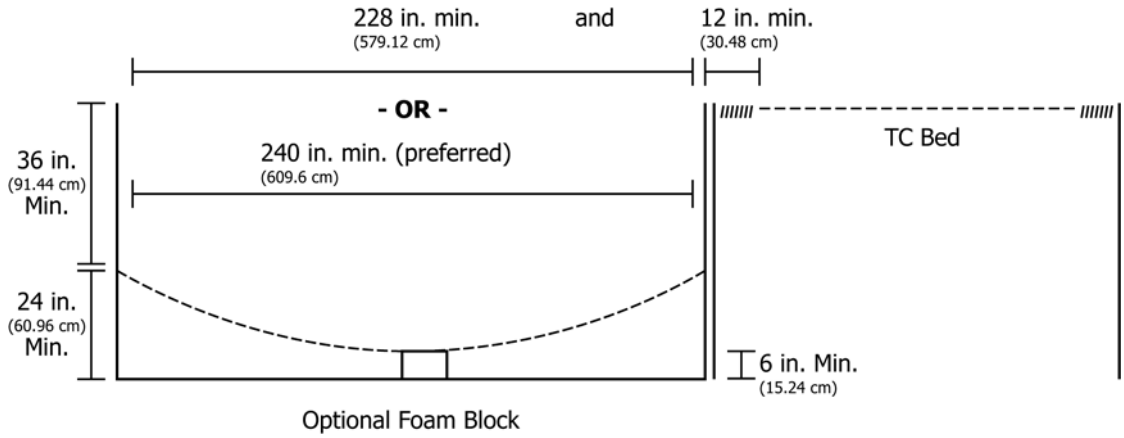


**FIG. 3 TC Foam Pit Side View**

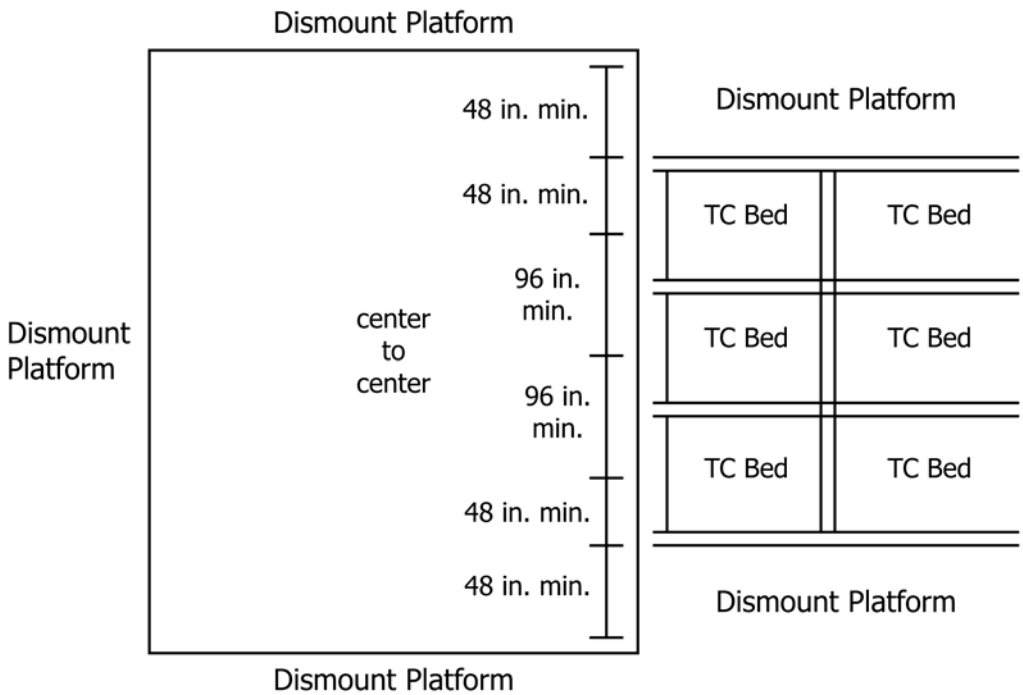


**FIG. 4 Example TC Foam Pit Overview With Dismount Platforms**

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.

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

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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.

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 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.

7.8.17 Impact attenuation block material shall have an indentation force deflection rating between 25 and 50 lb (111.206 and 222.411 N) 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.)

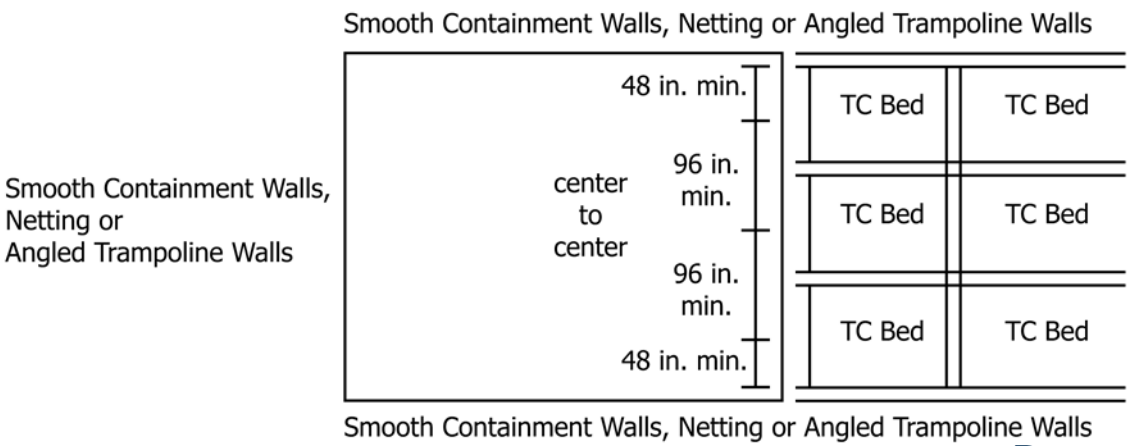


**FIG. 5 Example TC Foam Pit Overview With Smooth Containment Walls, Netting or Angled Trampoline Walls**

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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 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.

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