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: F406 – 22

Standard Consumer Safety Specification for Non-Full-Size Baby Cribs/Play Yards[1]

This standard is issued under the fixed designation F406; 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.

INTRODUCTION

This consumer safety specification addresses incidents associated with non-full-size cribs/play yards that were identified by the U.S. Consumer Product Safety Commission (CPSC).

Incidents identified by the CPSC and addressed in this standard include asphyxiation due to entrapment in mesh drop side units left with a side down, strangulation by entanglement on protruding hardware, strangulation by button entrapment in mesh openings, strangulation due to failure of the center hinge on a top rail, collapse or failure of the locking devices, collapse of the floor or sides, and choking on vinyl bitten from the top rail. This specification also addresses wooden non-full-size crib injuries or deaths due to entanglement on corner post extensions, dislodgment of slats resulting from breakage or failure of glue joints, collapse of mattress support, detachment of screws, dislodgement of teething rails, and entanglement on cords or strings.

This specification is not intended to cover non-full-size cribs/play yards that are either blatantly misused or abused. This specification is written within current state-of-the-art of non-full-size crib/play yard technology and is intended to be updated if substantive information becomes available that necessitates additional requirements or justifies revision of existing requirements.

1. Scope

1.1 This consumer safety specification establishes testing requirements for structural integrity and performance requirements for non-full-size cribs/play yards, both rigid sided and mesh/fabric assemblies. It also provides requirements for labeling and instructional material. The term unit or product will refer to a non-full-size crib/play yard.

1.2 This specification covers a framed enclosure with a floor made for the purpose of providing sleeping or playing accommodations, or both, for a child who cannot climb out and is less than 35 in. (890 mm) in height. It also covers bassinet, changing table, or similar accessories to a non-full size crib/play yard. These accessories shall also comply with the applicable requirements of ASTM standards addressing those accessories. For example, a changing table that attaches to a play yard shall also comply with the applicable requirements in Specification F2388. This specification does not cover inflatable products.

1.3 No product produced after the approval date of this consumer safety specification shall, either by label or other means, indicate compliance with this specification unless it conforms to all applicable requirements contained herein, before and after all testing.

1.4 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.

1.5 The following safety hazards caveat pertains only to the test method portion, Section 8, of this specification: *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.*

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[1] This consumer safety specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.18 on Cribs, Toddler Beds, Play Yards, Bassinets, Cradles and Baby Changing Products.

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1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

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Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1424 Test Method for Tearing Strength of Fabrics by Falling-Pendulum (Elmendorf-Type) Apparatus

D1683/D1683M Test Method for Failure in Sewn Seams of Woven Fabrics

D3359 Test Methods for Rating Adhesion by Tape Test

D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

F963 Consumer Safety Specification for Toy Safety

F1004 Consumer Safety Specification for Expansion Gates and Expandable Enclosures

F1487 Consumer Safety Performance Specification for Playground Equipment for Public Use

F2388 Consumer Safety Specification for Baby Changing Products for Domestic Use

2.2 *EN Standards:*[3]

EN 716–1:1995 Cots and Folding Cots for Domestic Use

EN 12227–1:1999 Playpens for Domestic Use

2.3 *ISO Standard:*[4]

IS0 8124-1:2000 Safety Aspects Related to Mechanical and Physical Properties

2.4 *Federal Regulations:*[5]

16 CFR 1303 Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint

16 CFR 1500 Hazardous Substances Act Regulations including sections:

1500.3 (c) (6) (vi) Definition of "Flammable Solid"

1500.44 Method for Determining Extremely Flammable and Flammable Solids

1500.48 Technical Requirements for Determining a Sharp Point In Toys and Other Articles Intended for Use By Children Under Eight Years of Age

1500.49 Technical Requirements for Determining a Sharp Metal or Glass Edge in Toys or Other Articles Intended for Use By Children Under Eight Years of Age

1500.50-.52 Test Methods for Simulating Use and Abuse of Toys and Other Articles Intended for Use By Children

16 CFR 1501 Method for Identifying Toys and Other Articles Intended for Use By Children Under Three Years of Age Which Present Choking, Aspiration, or Ingestion Hazards Because of Small Parts

16 CFR 1509 Requirements for Non-Full-Size Baby Cribs

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *accessory attachment components, n*—the components that provide the means of attachment for a bassinet/cradle accessory to a play yard. (See Fig. A1.1.)

3.1.2 *bassinet/cradle accessory, n*—an elevated sleep surface that attaches to play yard designed to convert the product into a bassinet/cradle intended to have a horizontal sleep surface while in a rest (non-rocking) position.

3.1.3 *cantilevered accessory, n*—accessory that is supported and attached at only one end of the component to a non-full size crib/play yard (see Fig. A1.2).

3.1.4 *conspicuous, adj*—Describes a label that is visible, when the unit is in a manufacturer's recommended use position, to a person standing near the unit at any one position around the unit but not necessarily visible from all positions.

3.1.5 *cord, n*—length of slender flexible material including monofilaments, rope, woven and twisted cord, plastic and textile tapes, ribbon, and those materials commonly called string.

3.1.6 *corner post, n*—vertical post located at the corner of a product.

3.1.7 *dropgate, n*—side that is intended to pivot with respect to the frame when the product is in the manufacturer's recommended use position to provide easier access to the occupant.

3.1.7.1 *Discussion*—Rationale: The word "telescope" was deleted because telescoping sides are really covered under the definition of movable sides. Dropgates are products that pivot only. For reference, the definition of movable side in Consumer Safety Specification F406 is "top portion of an otherwise stationary side that is intended to move with respect to the frame (other than a foldable side) when the product is in the manufacturer's recommended use position to provide easier access to the occupant.

3.1.8 *dynamic load, n*—application of an impulsive force through free fall of a weight.

3.1.9 *fabric, n*—any woven, knit, coated, laminated, extruded or calendered flexible material that is intended to be sewn, welded, heat sealed, or glued together as an assembly.

3.1.10 *foldable side or end, n*—side or end panel intended to be stationary with respect to the frame when a product is in the manufacturer's recommended use position, but that folds to allow for carrying or storage of the product.

3.1.11 *key structural elements, n*—side assemblies, end assemblies, mattress supports or stabilizing bars which create the occupant retention area.

3.1.12 *manufacturer's recommended use position, n*—any position that is presented by the manufacturer in any descriptive or instructional literature as a normal, allowable, or acceptable configuration for use of the product. This specifically excludes positions that the manufacturer shows in a like manner in its literature to be unacceptable, unsafe, or not recommended.

[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 National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

[4] Available from International Organization for Standardization (ISO), 1 rue de Varembé, Case postale 56, CH-1211, Geneva 20, Switzerland.

[5] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

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3.1.13 *mattress, n*—pad with a fabric, vinyl, or other material case filled with resilient material (such as cotton, foam, fiberfill, etc.) used as or on the floor of the unit.

3.1.14 *mattress support surface, n*—the internal surface of the play yard which supports the mattress or mattress assembly.

3.1.15 *mesh, n*—mesh may be either a woven fabric in which the warp and filling yarns are interlaced, a knitted fabric in which the wales and courses yarns are interlocked, or any other type of fabric that may be developed that provides openings therein.

3.1.16 *mesh/fabric unit, n*—unit constructed with a rigid frame assembly and a fabric or mesh assembly, or both, used to function as sides, ends, or floor, or a combination thereof.

3.1.17 *moveable side, n*—top portion of an otherwise stationary side that is intended to move with respect to the frame (other than a foldable side) when the product is in the manufacturer's recommended use position to provide easier access to the occupant.

3.1.18 *non-full-size crib, n*—crib that (*1*) is intended for use in or around the home, for travel and other purposes; and (*2*) has an interior length dimension either greater than 55 in. (139.7 cm) or smaller than 49¾ in. (126.3 cm), or an interior width dimension greater than 30⅝ in. (77.7 cm) or smaller than 25⅜ in. (64.3 cm), or both.

3.1.18.1 *Discussion*—This does not include mesh/net/screen cribs, nonrigidly constructed cribs, cradles (both rocker and pendulum types), car beds, baby baskets and bassinets (also known as junior cribs). Non-full-size crib includes, but is not limited to, the following:

3.1.18.2 *oversize crib, n*—non-full-size crib with an interior length dimension greater than 55 in. (139.7 cm), or an interior width dimension greater than 30⅝ in. (77.7 cm), or both.

3.1.18.3 *portable crib, n*—non-full-size crib designed so that it may be folded or collapsed, without disassembly, to occupy a volume substantially less than the volume it occupies when it is used.

3.1.18.4 *specialty crib, n*—unconventionally shaped (circular, hexagonal, etc.) non-full-size crib incorporating a special mattress or other unconventional components.

3.1.18.5 *undersize crib, n*—non-full-size crib with an interior length dimension smaller than 49¾ in. (126.3 cm), or an interior width dimension smaller than 25⅜ in. (64.3 cm), or both.

3.1.19 *non-paper label, n*—any label material (such as plastic or metal) that either will not tear without the aid of tools or tears leaving a sharply defined edge or labels made from fabric.

3.1.20 *occupant, n*—that individual who is in a product that is set up in one of the manufacturer's recommended use positions.

3.1.21 *paper label, n*—any label material that tears without the aid of tools and leaves a fibrous edge.

3.1.22 *play yard (aka playpen), n*—framed enclosure that includes a floor and has mesh or fabric sided panels primarily intended to provide a play or sleeping environment for children; it may fold for storage or travel.

3.1.23 *play yard/non-full size crib dependent accessory, n*—component with a rigid frame such as a bassinet or changing table that attaches to a non-full size crib/play yard and that, because of its structure, location, or movement, may expose a non-full size crib/play yard occupant to an opening presenting an entrapment hazard. Accessories that physically appear usable and functional on the play yard/non-full size crib frame (without an accompanying full bassinet accessory attached) are considered a play yard/non-full size crib dependent accessory, regardless of the manufacturer's instruction. Play yard/non-full size crib dependent accessories do not include: (*1*) items that hang outside the occupant areas, such as organizers and storage bags, (*2*) canopies that have no rigid frame members running alongside any top rail, and (*3*) full accessories.

3.1.23.1 *full accessories, n*—any accessory that fully covers the top opening to the play yard/non-full size crib without any gaps or openings. Non-exhaustive examples of full accessories include 3.1.23.2 and 3.1.23.3.

3.1.23.2 *full bassinet accessories, n*—an accessory that utilizes the play yard/non-full size crib floor in its entirety, fully flat, in an elevated position.

3.1.23.3 *bassinet dependent accessories, n*—an accessory that relies entirely on the full bassinet accessory for attachment and structural support; these accessories must be used in conjunction with a full bassinet and so are considered full accessories.

3.1.24 *protrusion, n*—projection on the unit over which an item worn by a child may become hooked.

3.1.25 *rigid sided product, n*—product with sides/ends constructed of rigid materials like wood, plastic, or metal generally configured as a horizontal rail/vertical slat assembly.

3.1.26 *seam, n*—means of joining fabric components such as sewing, welding, heat sealing, or gluing.

3.1.27 *static load, n*—vertically downward force applied by a calibrated force gage or dead weights.

3.1.28 *stationary side, n*—side or end panel that is not intended to fold, slide, or move with respect to the frame when the product is in the manufacturer's recommended use position.

3.1.29 *strap, n*—piece of flexible material of which the width is significantly greater than the thickness.

3.1.30 *structural failure, n*—damage to a component(s) or assembly resulting in partial separation (greater than 0.04 in. (1 mm) over original configuration), or complete separation of the component(s) or assembly.

4. Calibration and Standardization

4.1 All testing shall be conducted on a concrete floor that may be covered with ⅛-in. (3-mm) thick vinyl flooring cover, unless test instructs differently.

4.2 The unit shall be completely assembled, unless otherwise noted, in accordance with the manufacturer's instructions.

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4.3 No testing shall be conducted within 48 h of manufacturing.

4.4 The product to be tested shall be preconditioned in a room with ambient temperature of 73 ± 9°F (23 ± 5°C) for at least 1 h prior to testing. Testing shall then be conducted within this temperature range.

4.5 All testing required by this specification shall be conducted on the same unit.

5. General Requirements

5.1 *Corner Posts:*

5.1.1 No corner post assembly shall extend more than 0.06 in. (1.50 mm) above the upper edge of an end or side panel, whichever is higher, when measured from the lowest point on the upper edge of the end or side panel within 3 in. (76 mm) from the outermost contour of the post or elbow (see Fig. A1.3).

5.1.1.1 This requirement applies when any moveable side is in either the raised or lowered position.

5.1.2 The limitations in 5.1.1 do not apply to a corner post assembly that extends at least 16 in. (400 mm) above the uppermost surface of the side rail in its highest position.

5.1.3 Corner posts intended to accept removable vertical extensions made up of two or more segments (such as canopy post extensions) shall not permit the attachment of individual segments such that the resultant vertical extension would be in violation of the dimensional requirements of 5.1.

5.1.4 The dimensional requirements in 5.1 shall also apply to vertical members of circular cribs.

5.2 There shall be no hazardous sharp points or edges as defined by 16 CFR 1500.48 and 16 CFR 1500.49 before or after testing to this specification.

5.3 There shall be no small parts, as defined by 16 CFR 1501, before testing or liberated as a result of testing in accordance with this specification.

5.4 The paint and surface coating on the product shall comply to 16 CFR 1303.

5.5 There shall be no flammable solids as defined in 16 CFR 1500.3 (c) (6) (vi) before or after testing in accordance with this specification.

5.6 *Scissoring, Shearing, or Pinching:*

5.6.1 A product, when in the manufacturer's recommended use position, shall be designed and constructed to prevent injury to the occupant from any scissoring, shearing, or pinching when members or components rotate about a common axis or fastening point, slide, pivot, fold, or otherwise move relative to one another. Scissoring, shearing, or pinching that may cause injury shall not be permissible when the edges of the rigid parts admit a probe that is greater than 0.210 in. (5.30 mm) and less than 0.375 in. (9.50 mm) diameter at any accessible point throughout the range of motion of such parts.

5.6.2 Products that allow the top rail to be in a lowered position when the unit is erected, as shown in Fig. A1.4, shall be evaluated for the potential for scissoring, shearing or pinching. Those components of the top rail, its hinges, locks, or mechanism that are deemed to be capable of scissoring, shearing or pinching shall be tested in accordance with 5.6.2.1 – 5.6.2.4.

5.6.2.1 At all intersections of the *drop top rail* with the *top rail saddle* (Point A, Fig. A1.4), the insertion of a probe greater than 0.210 in. (5.30 mm) in diameter and less than 0.375 in. (9.50 mm) in diameter to a depth of more than 0.210 in. (5.30 mm) shall not be permitted in any position throughout the range of motion of the top rail.

5.6.2.2 All intersections of the *hinge legs* and *saddle* with the *drop top rail* and the *inclined leg* (Point B, Fig. A1.4) where no padding of ¼ in. (6.30 mm) or less exists, shall allow a 0.375-in. (9.50-mm) diameter probe to pass between adjacent members in any and all positions when rotating the hinge legs about their respective pivots.

5.6.2.3 The hinge legs shall allow a 0.375-in. (9.50-mm) diameter probe to pass between said hinge legs in any and all positions allowed when rotating the hinge legs about their respective pivots.

5.6.2.4 At all intersections of the drop side rail locking mechanism (hinge legs with the saddle) (Point C, Fig. A1.4) the intersection of the probe greater than 0.210 in. (5.30 mm) in diameter, and less than 0.375 in. (9.50 mm) in diameter, and greater than 0.210 in. (5.30 mm) deep within the intersecting parts in any and all positions shall not be permitted.

5.7 Toy accessories attached to, removed from, or sold with a product, as well as their means of attachment, must meet applicable requirements of Specification F963.

5.8 *Latching and Locking Mechanisms:*

5.8.1 All latches that are intended to be latched and unlatched during normal use while the child is in the product shall engage automatically when placed in the use position before and after testing. Latches may be manually activated to allow placement into the use position but must engage automatically when released.

5.8.2 Any unit that folds shall have a latching or locking device or other provision in the design that will prevent the unit from unintentionally folding when properly placed in the manufacturer's recommended use position.

5.8.2.1 During and upon completion of all testing, the unit shall remain in its manufacturer's recommended use position.

5.8.3 If a unit is designed with a latching or locking device:

5.8.3.1 That device shall remain engaged and operative after testing.

5.8.3.2 Each single-action locking or latching device that is provided to prevent folding shall require a minimum force of 10 lbf (45 N) to activate the release mechanism when tested in accordance with 8.13.2.

5.8.3.3 Each double-action locking or latching device that is provided to prevent folding shall require two distinct and separate actions for release. There are no force requirements for double-action locking or latching devices. For a device that is located under the mattress, the removal of a mattress is considered one of the two required actions for the release of a double action device.

5.8.3.4 Product designs requiring latching or locking of a top rail(s) to prevent folding that include central hinge(s) and rail assembly(ies) that moves downward when [illegible] as

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shown in Fig. A1.5, shall have a locking device that automatically engages when placed in a manufacturer's recommended use position.

5.8.3.5 No top rail shall give the appearance of being in the manufacturer's recommended use position unless the locking device is fully engaged. If the product has a latching device that automatically engages and is intended to be set up by first erecting the side rails, and then depressing a center floor hub, the product shall be evaluated for false latch by testing in accordance with 8.27.

5.9 *Openings:*

5.9.1 Holes or slots that extend entirely through a wall section of any rigid material less than 0.375-in. (9.53-mm) thick and admit a 0.210-in. (5.33-mm) diameter rod shall also admit a 0.375-in. (9.53-mm) diameter rod. Holes or slots that are between 0.210 in. (5.33 mm) and 0.375 in. (9.53 mm) and have a wall thickness less than 0.375 in. (9.53 mm), but are limited in depth to 0.375-in. (9.53-mm) maximum by another rigid surface shall be permissible (see Fig. A1.6). The product shall be evaluated in all manufacturer's recommended use positions. Holes and openings in surfaces that are in contact with the floor or are below the mattress support and more than 3 in. (76 mm) in from the perimeter of the frame or outer perimeter of the occupant space of a play yard or non full-size crib are exempt from this requirement because they are deemed not accessible to the occupant or child on the outsides of the product.

5.9.2 Openings in the surface of a mattress support made of a rigid material shall be designed to prevent entrapment of fingers, toes, hands, or feet if the occupant can readily move, lift, or fold the mattress to expose the opening. This requirement does not apply to rigid-sided products where the total thickness of the mattress including all fabric or vinyl layers, filling material, and any structural members such as wood, hardboard, etc. exceeds 2½ in. Round openings shall comply with 5.9.1 and shall not exceed 1.25 in. (32 mm) in diameter. For other shaped openings, the opening shall comply with 5.9.1 and any linear continuous portion of an opening that admits a 0.375-in. (9.5-mm) diameter rod must fit within a 1.25-in. (32-mm) diameter circle.

NOTE 2—Rationale: The minor dimension of 0.210 and the major dimension of 0.375 is to prevent finger and toe entrapments in accessible holes and slots in juvenile products intended for children 6 to 24 months of age. These dimensional requirements are currently the standard for many juvenile products. This subcommittee is not aware of incident data that would support a change to these dimensions.

Adding the phrase "through a wall section of a rigid material less than 0.375 in." simplifies the testing procedure and is similar to existing international standards and Specification F963. International standards (EN 716–1: 1995 and EN 12227–1:1999) state a depth of 10 mm (0.394 in.) which is similar to the proposed 0.375 in. thickness. The thickness of 0.375 is also greater than existing toy standards Specification F963 and IS0 8124-1:2000, which is only 0.062 in. thick.

The evaluation is limited to holes and openings that are accessible inside the play yard or accessible to a child outside the play yard. The areas of a play yard or non-full-size crib that are not accessible are those components and surfaces on the underside of the floor and support structure that are some distance in from the outer perimeter, for example, tubing, center floor support hub, and the hardboard mattress support.

The requirements to not apply to mattresses with a thickness greater than 2½ in. because the occupant is unlikely to be able to access the mattress support under such a thick mattress.

5.10 *Protective Components*—If the child can grasp components between the thumb and forefinger, or teeth, (such as caps, sleeves, or plugs used for protection from sharp edges, points, or entrapment of fingers or toes) or if there is at least a 0.040-in. (1.00-mm) gap between the component and its adjacent parent component, such component shall not be removed when tested in accordance with 8.21.

5.11 *Labeling:*

5.11.1 Warning labels (whether paper or nonpaper) shall be permanent when tested in accordance with 8.18.

5.11.2 Warning statements applied directly onto the surface of the product by hot stamping, heat transfer, printing, wood burning, etc. shall be permanent when tested in accordance with 8.19.

5.11.3 Nonpaper labels shall not liberate small parts when tested in accordance with 8.20.

5.11.4 Storage pouch or other part with warning statements printed on it, excluding labels, shall be considered permanent if it cannot be removed when tested in accordance with 8.23.

5.12 *Stability*—When subjected to the test described in 8.17, a minimum of three perimeter support points of the product not in a straight line shall remain in contact with the inclined plane. Products with an adjustable mattress support shall be tested with the mattress in the lowest adjustment position.

5.13 *Cords/Straps:*

5.13.1 *Cords/Straps Free Length*—Any cord or strap made of a flexible material such as fabric, elastic, or plastic attached to the product shall have a free length of 7.4 in. (188 mm) or less when tested in accordance with 8.24.1.

5.13.2 *Cords/Straps That Can Form Loops*—Cords/straps attached to the product, whether fastened or unfastened, shall not be capable of connecting or tangling to form a loop in conjunction with the product that has a perimeter of 16.3 in. (414 mm) or more when tested in accordance with 8.24.2.

5.14 *Coil Springs*—Any exposed coil spring that is accessible to the occupant, having or capable of generating a space between coils of 0.210 in. (5.30 mm) or greater during static load testing specified in 8.6, 8.11, 8.12, and 8.13 shall be covered or otherwise designed to prevent injury from entrapment.

5.15 *Entrapment in Accessories*—These requirements apply to play yard/non-full size crib dependent accessories as defined in 3.1.23 and cantilevered accessories defined in 3.1.3 that do not qualify as full accessories (3.1.23.1) that attach to or rest on a non-full size crib/play yard. (See Fig. A1.7 for an example of an accessory that attaches to the play yard on one side and rests on the play yard on the other side.) These requirements do not apply to full accessories as defined in 3.1.23.1 unless there is an occupant access "door" in the walls of the play yard/non-full size crib. In this section, the small head probe prescribed is shown in Fig. A1.8; the large head probe prescribed is shown in Fig. A1.9.

5.15.1 *Entrapment*—When tested in accordance with the procedures in 8.26.1 and 8.26.2, openings in accessories and cantilevered accessories shall not allow the complete passage

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of the small head probe, unless they allow the complete passage of the large head probe.

5.15.2 *Detachment*—When tested in accordance with the procedures in 8.26.1 and 8.26.3, any opening exposed by the test shall not allow the complete passage of the small head probe.

5.15.3 *Rationale*—The entrapment test is to address entrapment when an accessory is added to a non-full size crib/play yard that could create an opening that may entrap an occupant's head. Openings shall be evaluated with accessories in any possible location. Openings are also evaluated after application of a 25-lbf force to the small head probe. This is the same force used to evaluate entrapment in shelves in the changing table standard. A 25-lbf force is also used in evaluating mattress support systems in the current non-full size crib/play yard/non-full-size and full-size crib standards. The small head probe represents the 5th percentile 6-month-old child because that is the youngest child having the developmental abilities to become entrapped.

5.15.4 With the accessory installed on the play yard/non-full size crib per the manufacturer's instructions, cords and straps on the accessory, whether fastened or unfastened, must not be capable of forming a loop in conjunction with the product that allows complete passage of the small head probe. Restraints straps shall be evaluated in all possible configurations, other than the manufacturer's intended use position fastened on top of the product surface. In addition, restraint straps are to be evaluated as follows:

5.15.4.1 *Evaluation on Underside of Accessory*—If any restraint component can be pushed or pulled with a force less than 25 lb through any opening that extends completely through the accessory, the restraint component shall be pushed or pulled through the accessory and evaluated in the fastened and unfastened condition below the lowest surface on the underside of the accessory (see Fig. A1.10). Any loop(s) formed shall not allow complete passage of the small head probe.

5.15.4.2 When fastened per the manufacturer's instructions, extended to their greatest length and draped over the side of the accessory (see Fig. A1.11), restraint straps shall not allow complete passage of the small head probe below the lowest surface on the underside of the accessory.

5.16 *Mattress:*

5.16.1 Each product, other than those that are designed exclusively for play and not for sleep, and are intended to be used without a mattress, shall be sold with the mattress included.

5.16.2 Mesh/fabric play yard products shall meet 5.16.2.1 or 5.16.2.2.

5.16.2.1 *Mattresses up to 1.5 in. thick:*

(1) The filling material of the mattress such as foam, fiberfill, etc. shall not exceed 1 in. (25 mm) in thickness. The total thickness of the mattress including all fabric or vinyl layers, filling material, and any structural members such as wood, hardboard, etc. shall not exceed 1½ in. (38.1 mm).

5.16.2.2 *Mattresses over 1.5 in. thick:*

(1) Total thickness of the mattress including all fabric or vinyl layers, filling material, and any structural members such as wood, hardboard, etc. shall not exceed 2 in. (50.8 mm).

(2) Mattress to Product Side Gap Measurement—When a mattress is centered in the manufacturer's recommended use position, and installed with all required attachment means, no gaps greater than ½ in. (12.7 mm) shall be present when measured according to 8.32.

5.17 *Mattresses for Rigid Sided Products (see* Fig. A1.12 *and* Fig. A1.13*):*

5.17.1 *Mattress Thickness:*

5.17.1.1 A mattress supplied with a non-full-size crib shall, in a noncompressed state, have a thickness that will provide a minimum effective crib-side height dimension of at least 20 in. (50.8 cm) as measured from the upper surface of the crib side or end panel, or both. For this measurement, the crib side shall be in its highest adjustable position and the mattress support in its lowest adjustable position.

5.17.1.2 A mattress supplied with a non-full-size crib shall, in a noncompressed state, have a thickness that will provide a minimum effective crib-side height dimension of at least 3 in. (7.6 cm) as measured from the upper surface of the mattress to the upper surface of the crib side or end panel, or both. For this measurement, the crib side shall be in its lowest adjustable position and the mattress support in its highest adjustable position.

5.17.2 *Mattress Dimensions*—The dimensions of a mattress supplied with a non-full-size crib shall be such that the mattress, when inserted in the center of the crib, in a noncompressed state at any of the adjustable positions of the mattress support, shall not leave a gap of more than ½ in. (1.3 cm) at any point between the perimeter of the mattress and the perimeter of the crib. When the mattress is placed against the perimeter of the crib the resulting gap shall not exceed 1 in. (2.6 cm).

5.18 *Protrusions*—Neither string on the weight gage shall stay attached to a protrusion when tested in accordance with 8.25.

5.19 *Bassinet/Cradle Accessories – Missing Accessory Attachment Components:*

5.19.1 Bassinet/cradle accessories that have all accessory attachment components permanently attached to the bassinet/cradle accessory, or by any permanent means prohibiting their removal from the bassinet/cradle accessory, are exempt from the requirements described in 5.19.2.

5.19.2 Bassinet/cradle accessories which require consumer assembly of accessory attachment component(s), and that can be assembled and attached to the product with any accessory attachment component(s) missing, shall meet either 5.19.2.1 or 5.19.2.2 when each accessory attachment component not permanently attached is removed.

5.19.2.1 The bassinet/cradle accessory shall collapse such that any part of the mattress pad contacts the bottom floor of the play yard or is not able to support the 4.0 lbm test mass when tested to 8.31.

5.19.2.2 The bassinet/cradle accessory sleep surface shall tilt by more than 30° when tested to 8.31.

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NOTE 3—Rationale: The Bassinet/cradle missing accessory attachment components requirements were included to address IDI110825CAA2853 involving a bassinet accessory used in a play yard where accessory attachment components were omitted during the assembly, installation and use of the bassinet accessory. The omission of such critical components may result in a hazardous condition. The requirement allows for visual cues for the bassinet accessory during testing including collapse or surface tilt of at least 30°. These requirements were considered obvious cues to the consumer to indicate that the product is not assembled or installed correctly. Children weighing less than 4 lb are typically not released from the hospital consequently the 4-lb mass is based on the minimum expected weight of the youngest occupant.

5.20 *Record Keeping*—The manufacturer or importer shall keep and maintain for 6 years after production or importation of each lot or other identifying unit of rigid non-full-size cribs, records of sale and distribution. These records shall be made available upon request at reasonable times to any officer, employee, or agent acting on behalf of the Consumer Product Safety Commission. The manufacturer or importer shall permit such officer, employee, or agent to inspect and copy such records, to make such inventories of stock as he or she deems necessary, and to otherwise verify the accuracy of such records.

6. Performance Requirements for Rigid Sided Products

6.1 Before and after all testing, the product shall comply with the requirements of Section 5.

6.2 *Crib-Side Height (see* Fig. A1.12 *and* Fig. A1.13*):*

6.2.1 For moveable sides, with the mattress support in its highest adjustable position and the crib side in its lowest adjustable position, the vertical distance from the upper surface of the mattress support to the upper surface of the crib side or end panel, or both, shall not be less than 5 in. (12.7 cm).

6.2.2 For stationary sides, with the mattress support in its highest adjustable position, the vertical distance from the upper surface of the uncompressed mattress to the upper surface of the crib side or end panel, or both, shall not be less than 9 in. (22.8 cm).

6.2.3 With the mattress support in its lowest adjustable position and the crib side in its highest adjustable position, the vertical distance from the upper surface of the mattress support to the upper surface of the crib side or end panel, or both, shall not be less than 22 in. (55.8 cm).

6.2.4 *Crib Side Configurations*—Cribs with side(s) having moveable components intended to aid in access to the occupant shall have those sides rigidly attached to the crib ends and contain no movable section less than 14 in. (35.6 cm) from the top of the non-compressed mattress with the mattress support in its lowest adjustable position.

6.2.5 *Rationale*—This requirement effectively bans standard drop sides. The 14 in. dimension is based on the requirements of 16 CFR 1509.9 which requires that the mattress supplied with the product in a non-compressed state shall provide a minimum effective crib-side height dimension of at least 20 in. with the crib side in the highest position and the mattress support in the lowest position. A 6-in. drop gate reduces this height to 14 in.

6.3 *Spacing of Unit Components:*

6.3.1 *Uniformly Spaced Components*—The distance between adjacent, uniformly spaced components (such as slats, spindles, or corner posts, or a combination thereof) shall not be greater than 2⅜ in. (6 cm). The distance between any such adjacent components shall not exceed 2½ in. (6.3 cm) at any point when subjected to the test procedure specified in 8.2.

6.3.2 *Nonuniformly Spaced Components:*

6.3.2.1 The distance between adjacent nonuniformly spaced components (such as slats, spindles, or corner posts, or a combination thereof) shall preclude passage of block A, specified in 8.1, when inserted in any orientation (nonuniformly spaced components referes to irregularly shaped crib slats whether parallel to each other or not).

6.3.2.2 The spacing between any such adjacent components shall preclude passage of block B, specified in 8.1, when inserted in any orientation immediately above and below the loading wedge specified in 8.1 while the components are being subjected to the test procedure specified in 8.2.

6.4 *Hardware:*

6.4.1 The hardware in a non-full-size crib shall be designed and constructed to eliminate pinching, bruising, lacerating, crushing, amputating, or other potentials for injury, or a combination thereof, when the crib is in normal use or when subjected to reasonably foreseeable damage or abuse.

6.4.2 Non-full-size cribs shall incorporate locking or latching devices for dropgates or other moveable sides. These devices shall require either a minimum force of 10 lb (4.5 kg) for activation or at least two distinct actions to release them.

6.5 *Fasteners:*

6.5.1 *Wood Screws:*

6.5.1.1 Wood screws shall not be used in the assembly of key structural elements that must be removed by the consumer in the normal disassembly of a crib.

6.5.1.2 No crib shall require consumer assembly of key structural elements using wood screw fasteners. This shall not apply to drawers or other storage components or accessory items.

6.5.2 Factory assembly using wood screws on key structural elements is allowed if the wood screws are a second method of attachment or the wood screws include a lock washer, glue, or other means to impede loosening or detachment.

6.5.3 Metal inserts with external wood screw threads for screwing into a wood component and providing internal machine threads to accommodate a machine screw shall be glued or include other means to impede loosening or detaching.

6.5.4 Wood screws are permitted be used as the primary fasteners or only fasteners for non-key structural elements.

6.5.5 Metal to metal threaded fasteners, such as sheet metal screws and machine screws, secured into metal components and used to attach key structural elements shall have lock washers, self-locking nuts or other means to impede loosening as defined in 6.15.2 or detachment during the testing required by this standard.

6.5.6 *Rationale*—These requirements apply to fasteners that are used to create the enclosure for the occupant and are limited to fasteners that secure the sides to the corner posts or mattress support to the crib, or both. For these locations, a wood screw or threaded insert shall not be used as the primary attachment method unless the wood screw or threaded insert includes a supplemental means to impede loosening or detachment. The primary method of attachment must function to secure the

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component without the wood screw. The wood screw may be used as an additional means of securing the components. Examples of primary methods of attachment are wood glue joints, threaded steel inserts that are screwed into wood for using machine screws, rivets, etc.

6.6 *Construction and Finishing:*

6.6.1 All wood surfaces of non-full-size cribs shall be smooth and free from splinters.

6.6.2 All wood parts of non-full-size cribs shall be free from splits, cracks, or other defects that might lead to structural failure.

6.6.3 Ends and sides of non-full-size cribs shall have no horizontal bar, ledge, projections, or other surface accessible to the child inside the crib with a depth dimension greater than ⅜ in. (1 cm) that could be used as a toehold located more than 1 in. (2.54 cm) and less than 16 in. (40.6 cm) above the mattress support in its lowest position when the side rail is in its highest position.

6.7 *Requirements for Cutouts*—Non-full-size cribs shall comply with the test requirements of 8.3.

6.8 The performance testing requirements of 6.10 – 6.16 shall be performed in the following order:

Teething rail test
Cyclic testing
Crib side latch testing
Mattress support system vertical impact testing
Mattress support system testing
Crib side testing
Slat/spindle strength test

6.9 *Rationale*—The teething rail test should precede the other testing as it does not relate to the structural integrity of the product. Cyclic side shake testing should come next as the 72 000 cycles will subject the entire product to the simulated stresses that a non-full-size crib would undergo during a lifetime of shaking by a user. Crib side latch testing should immediately follow the cyclic testing as this is the assembly which would most likely to be affected by cyclic stresses. This should then be followed by the vertical impact testing and the mattresses support testing which is the assembly most likely to be affected by the vertical impact stresses. This should then be followed by the crib side impact which subjects the side rails to repeated impacts. The spindle/slat strength test should come last as these structural elements are the most likely to be affected by the sum of all the preceding cyclic and impact tests.

6.10 *Plastic Teething Rail:*

6.10.1 This test consists of deforming the plastic teething rail under load to determine the security of the attachment.

6.10.2 Failure occurs when the feeler gage as defined in 8.4.1.1 can freely enter into a gap created by the deflection or deformation of the plastic teething rail, or both, when tested in accordance with 8.4.

6.11 *Cyclic Test*—No crib shall exhibit structural failure, loosening of fasteners as defined in 6.11.1, damage to latching or locking mechanisms, or failure of latching or locking mechanisms when tested in accordance with the test methods in 8.5.

6.11.1 After testing in accordance with the procedure in 8.5, key structural elements attached by screws or threaded fasteners shall not have separated by more than 0.04 in. (1.00 mm) upon completion of testing.

6.12 *Side(s) or End(s) Latch Testing, or Both*—This test assists in evaluating the integrity of the dropgate(s) or end(s) latching system, or both, under abusive load conditions.

6.12.1 *Dropgate or Other Moveable Side Latch Testing:*

6.12.1.1 This test consists of loading the end while a prescribed force is applied to the dropgate or other moveable side(s) (see 8.6.3 or 8.6.4, whichever is appropriate).

6.12.1.2 The latching mechanism shall not disengage during testing and shall continue to function in the intended manner upon completion of the testing.

6.12.2 *Foldable Side or End Latch Testing:*

6.12.2.1 This test consists of loading the latches intended to prevent folding of the side when in the manufacturer's recommended use position (see 8.6.5).

6.12.2.2 The latching mechanism shall not disengage during testing and shall continue to function in the intended manner upon completion of the testing.

6.13 *Mattress Support System Vertical Impact Test Requirements*—After testing in accordance with the procedure in 8.7, the non-full size crib shall comply with the requirements of Section 5. Key structural elements attached by screws shall not have separated by more than 0.04 in. (1.00 mm) upon completion of testing.

6.14 *Mattress Support System Testing*—These tests assist in evaluating the integrity of the attachment of the mattress support to the product.

6.14.1 A mattress support that is fixed with respect to the unit frame, is tested in accordance with 8.8. Test failure occurs if the mattress support system becomes detached from the frame at any point of attachment, or if the force cannot be maintained.

6.14.2 A mattress support that is not fixed on opposite sides to the unit frame (for example, a hinged support or a support created by a recessed area in which the mattress support sits) is tested by gradually applying a 25-lbf (110-N) force in any direction to the mattress support to evaluate its attachment to the unit. The force is to be applied to the mattress support in each adjustment position. Test failure occurs if:

6.14.2.1 Any fixed portion of the mattress support system becomes detached from the unit at any point of attachment.

6.14.2.2 Any free-moving portion of the mattress support system that does not return to its intended use position once the force is removed. The force shall be removed after the force of 25 lbf (110 N) has been applied or the edge of the mattress support has been lifted at least 12 in. (300 mm).

6.15 *Crib Side Test Requirements:*

6.15.1 After completion of the cyclic and static portions of the side tests (see 8.9), the crib shall comply with the requirements of Section 5 and no spindles or slats shall have broken or completely separated from the top or bottom rail. Complete separation shall be determined by placing a right triangular prism shaped wedge (see Fig. A1.14) between two spindles or slats adjacent to the rail from which these have

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separated and applying a 20-lbf (90-N) pull force to the wedge in a direction normal to the plane of the crib side. If a spindle or slat moves away from the hole in the rail in which it was formerly secured, complete separation has occurred.

6.15.2 Components attached by screws shall not have separated by more than 0.04 in. (1 mm) upon completion of testing.

6.15.3 Any spindles or slats that could be rotated during the torque test shall comply with the spacing of crib components of Section 5 when turned to their most adverse position.

6.16 *Spindle/Slat Strength Testing*—After testing in accordance with the procedure in 8.10, there shall be no complete breakage of any spindle/slat or complete separation of either end of a spindle/slat from the crib assembly's horizontal members when tested per 8.10.2 and 8.10.3 except as explained in 8.10.4. Any failure, as defined in this paragraph, when testing per 8.10.4 and 8.10.5 shall constitute a failure of the test. Audible indications during testing shall not constitute evidence of failure. After testing, the spacing of spindles/slats shall comply with requirements of 6.3.

6.17 Non-full-size crib designs shall allow assembly of key structural elements only in the manufacturer's recommended use position or have permanent markings that indicate their correct orientation. The markings must be conspicuous in any misassembled state.

7. Performance Requirements for Mesh/Fabric Products

7.1 The product shall comply with the requirements of Section 5 before and after all testing in this section unless noted otherwise. The tests shall be performed in the order listed in this section.

NOTE 4—Mesh/fabric products that include a rigid side, end, or floor should be tested in accordance with Section 6 on that side, end, or floor.

7.2 *Height of Sides*—With mattress support in its lowest position, the height of sides of a unit shall be a minimum of 20 in. (508 mm) from the top of the non-compressed pad to the top of the side rail when the side rail is in its fully erected position.

7.3 *Side Deflection and Strength*—All tests in this section are to be performed sequentially.

7.3.1 Top rails and supporting members of the unit shall withstand a static load and shall not fracture, disengage, fold, or have a permanent deflection that reduces the height to less than that specified in 7.2 when tested in accordance with 8.11.2.2.

7.3.2 The side of the unit shall not deflect under load to a height less than 18 in. (460 mm) when measured vertically at the location where the load is applied when tested in accordance with 8.11.2.3.

7.3.3 The top rail and locking mechanism of the units having a top rail assembly with a central hinge (see Fig. A1.5) shall not break or disengage when tested in accordance with 8.11.2.4.

7.4 *Floor Strength*—The floor of the unit shall withstand application of a static load and a dynamic load when tested in accordance with 8.12. After completion of the test, the product shall comply with all requirements in Section 5 and have no structural failure in the frame, sides, ends, or floor.

7.5 *Top Rail Covering Material*—When unsupported or non-reinforced vinyls are used to cover any top rail or component, the thickness of the vinyl shall not be less than 0.011 in. (0.28 mm) when measured in accordance with 8.22.

7.6 *Mesh Requirements:*

7.6.1 *Mesh Openings*—Openings in the mesh shall be designed to prevent entrapment of fingers and toes and the snaring of buttons normally used in infant clothing. A mesh opening shall not admit a 0.250-in. (6.30-mm) diameter rod with a full-radius tip, when tested in accordance with 8.14.

7.6.2 *Mesh Strength*—No mesh shall, when tested in accordance with 8.15:

7.6.2.1 Break or rupture, or

7.6.2.2 Become separated from its supporting structure or accessories.

7.7 *Fabric Material Requirements:*

7.7.1 *Fabric Strength:*

7.7.1.1 Fabric materials used for sides, ends, or floor support, excluding mesh, shall have a breaking strength of at least 50 lbf (220 N) when tested in a dry condition in accordance with the grab test in the section on Preparation of Specimens of Test Method D5034, in both the warp and fill directions.

7.7.1.2 Fabric materials, used for sides, ends, or floor support excluding mesh, shall have a tear resistance of at least 2 lbf (9 N) when tested in accordance with Test Method D1424 (Elmendorf) in both the warp and fill direction.

7.8 *Mesh/Fabric Assembly Requirements:*

7.8.1 *Sewn Assembly*—All stitching that is used in the sides, ends, or floor support and is accessible to the occupant shall be lock-stitching or a chain stitch where the key thread is not accessible to the occupant. The key thread is a thread at the end of a seam that if pulled will pull the stitching apart and disassemble the sewn assembly.

7.8.2 *Seam Strength*—All seams used in the sides, ends, or floor support of the unit shall, when tested in accordance with Test Method D1683/D1683M, have a breaking strength of not less than 30 lbf (130 N).

NOTE 5—Samples required in this section should be taken from a new product assembly or representative raw materials, or both.

7.8.3 *Mesh/Fabric Attachment Strength*—All locations where a mesh/fabric or fabric assembly is mechanically fastened to a rigid structural element (for example, fastening of the mesh/fabric side to the perimeter of the hardwood floor) shall not disengage or deform under a load such that the fabric can be disassembled when tested in accordance with 8.16.

7.9 *Mattress Vertical Displacement:*

7.9.1 For the configurations described in 7.9.1.1 and 7.9.1.2, the change in mattress vertical displacement shall be less than 5.25 in. (133 mm) when tested in accordance with 8.28. For multi-use products, this requirement shall only be applied in their play yard mode.

7.9.1.1 Mattress assemblies that incorporate an integral floor structure and which are intended by the manufacturer to be removable.

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7.9.1.2 Products that incorporate a removable segmented floor structure separate from a removable mattress when the play yard is in the manufacturer's recommended use position. The removable mattress shall be removed from the product prior to testing in accordance with 8.28.

NOTE 6—Rationale: The 5.25 in. (133 mm) measurement was selected because it is the approximate height of the small head probe (5th percentile, 6-month old child; see Fig. A1.8). The entrapment hazard is present if a child can fit their head between the side of the product and the raised mattress or removable segmented floor structure, and then fit their head under the mattress pad. It was decided that measurement of the horizontal distance between the raised mattress and the sides of the product would be more difficult to obtain due to the varying flexibility of the side walls typically found in play yards. Greater certainty is achieved measuring the vertical distance that a mattress or removable segmented floor structure can be raised. Compliance to either of the two conditions should result in elimination of the hazard. Therefore, measurement of the vertical distance a mattress or removable segmented floor structure can be raised is used to determine if the hazard is present, since it is the more reliable and repeatable of the two measurements.

7.10 *Top Rail Configuration*—Play yards containing one or more rigid top rails that contain a central hinge/latching device(s) to lock the top rail in the use position and move vertically downward from the use position when unlocked (see Fig. A1.5) must meet the requirements detailed in 7.10.1 and, if applicable, 7.10.2. Non-rigid top rails must meet the requirements specified in 7.10.3.

7.10.1 The play yard shall allow the horizontal spacing probe (see Fig. A1.15) to be inserted between top rail segments to a depth equal to or greater than the horizontal width of the top rail segments when tested in accordance with 8.29.1.

7.10.2 The included (inside) angle between play yard top rail segments when one side of the hinge/latching device is locked shall be at least 75° within 3 in. of the hinge/latching device when tested in accordance with 8.29.2. Products which do not allow top rail segments to be locked separately are exempt from this requirement.

7.10.3 The play yard shall not allow simultaneous contact of surface or corners as defined in Table 1 using Test Template B when tested in accordance with 8.29.3.

NOTE 7—Rationale: The requirements in 7.10 for Top Rail Configuration are intended to address entrapment hazards associated with frames folding and creating a "V" shape when in their use position.

7.11 *Top Rail to Corner Post Attachment:*

7.11.1 After testing in accordance with 8.30, play yards shall not exhibit rail attachment failure as defined in 7.11.2.

7.11.2 *Rail Attachment Failure*—For the purposes of this section, "rail attachment failure" is defined as any crack in the corner brackets, fasteners pulling completely through a bracket wall, or fasteners or fastener pieces becoming liberated. Audible indications during testing shall not constitute evidence of failure.

TABLE 1 Simultaneous Contact Failure Combinations With Test Template B

Combination #	Simultaneously Contacted Surface or Corner Pairs		Result
1	B1	B2	Fail
2	C1	C2	Fail
3	C1	D	Fail
4	C2	D	Fail
5	B1C1	B2C2	Fail
6	C1D	C2D	Fail

NOTE 8—The requirements in 5.8 for Latching and Locking Mechanisms do not apply after completion of this test.

8. Test Methods

NOTE 9—All wood blocks are fabricated from 1 in. (25 mm) nominal thickness lumber having a finished thickness of ¾ in. (19 mm) unless otherwise specified.

8.1 *Component Spacing Test Apparatus:*

8.1.1 *Loading Wedge*—The loading wedge shall be a right triangular prism constructed of a smooth, rigid material conforming to measurements shown in Fig. A1.14.

8.1.2 *Block A*—Block A shall be a rectangular block, constructed of a smooth, rigid material, measuring 2⅜ in. wide by 4 in. high by 4 in. long (6 cm wide by 10 cm high by 10 cm long).

8.1.3 *Block B*—Block B shall be a rectangular block, constructed of a smooth, rigid material, measuring 2½ in. wide by 3¼ in. high by 3¼ in. long (6.3 cm wide by 8.2 cm high by 8.2 cm long).

8.2 *Component-Spacing Test Method*—The apex of the wedge (see 8.1.1) shall be placed midway between two vertical components and midway between the uppermost and lowermost horizontal surfaces of the crib side. A 20-lb (9-kg) tensile force shall be applied to the wedge perpendicular to the plane of the crib side.

8.3 *Test Requirements for Cutouts:*

8.3.1 Place the neck of the headform probe shown in Fig. A1.16 into any cutout (partially-bounded opening) located along the upper edges of an end or side panel. The axis of the neck shall be horizontal and at right angles to the plane of the panel at the point of contact. The head portion of the probe shall be on the outer side of the panel. With the neck resting on the panel at any point within the cutout area (for compliance purposes, the commission may test at all points that could result in a failure), and the front of the probe pointing downwards, draw the head of the probe towards the panel until surface "A" makes contact with the outer side of the panel (see Fig. A1.17).

8.3.2 Press down on the neck to cause the head to swing upwards through the cutout in the panel. The probe shall not be rotated about the major axis of the neck during this procedure. The arc through which the head is swung shall be in a vertical plane and shall terminate when the major axis of the neck attains an upright position or is prevented from attaining an upright position by an obstruction. During the test, contact shall be maintained between surface "A" (or at least one of edges "AB"), the neck of the headform probe and the panel. If, during the swing to the upright position, an edge or surface other than surface "D" is contacted, sideways motion of the headform shall not be restrained, but the arc through which the headform is swung shall remain vertical.

8.3.3 If a cutout is V-shaped (the side boundaries or the tangents to the side boundaries are nowhere parallel), an additional test shall be performed on the cutout. Upon completion of the swing to the upright position, lock the headform

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sideways parallel to the plane of the panel while maintaining contact between surface "A" or an edge "AB" and the panel. This will result in the probe sliding toward the bottom of the cutout. The maximum angle through which the headform is rocked shall be determined by contact with the panel by a surface or edge other than "A" or "AB" or until one of the surfaces "B" is in a vertical plane.

8.3.4 During the test described in 8.3.2 and 8.3.3, no portion of the panel shall contact:

8.3.4.1 Simultaneously, more than one of surfaces "B," "C," or edges "BC," "CC," or "CD" in any combination if they are on opposing sides of the headform.

8.3.4.2 Any of surfaces "D."

NOTE 10—Edges are identified by the letter designations for surfaces that lie on either side of the edge.

8.4 *Plastic Teething Rail Test for Rigid Sided Products:*

8.4.1 *Equipment:*

8.4.1.1 *Feeler Gage,* 0.040 by 1 in. (1 by 25 mm).

8.4.1.2 *Wood Block,* 2 by 2 in. (50 by 50 mm).

8.4.1.3 *Chatillon Push, Pull Force Gage,* DPPH-100 or equivalent.

8.4.2 *Procedure for Plastic Teething Rail Test:*

8.4.2.1 With plastic teething rail assembled to unit top rail, apply a 50-lbf (220-N) vertically downward force to the top of the teething rail through the hardwood block at the center top of the teething rail.

8.4.2.2 While this force is maintained, the feeler gage shall not fit between the vertical surfaces of the top rail and the inside surface or edge of the plastic teething rail (see Fig. A1.18).

8.4.2.3 Repeat at center location wherever a plastic teething rail is located.

8.5 *Cyclic Test:*

8.5.1 *Horizontal Cyclic Testing:*

8.5.1.1 The crib, including any accessories that are rigidly mounted to the crib, shall be assembled per the manufacturer's instructions except that any wheels or casters shall not be assembled. The testing in this section shall be conducted without casters. Items, such as drawers and hampers, when assembled in the manufacturer's recommended use positions, that are intended to move or slide and can be removed without the aid of tools shall be removed before testing.

8.5.1.2 The crib legs or base shall be restrained by an appropriate method to prohibit movement of the crib and shall not impede the application of the load or deflection of the side being tested for all phases of this test procedure.

8.5.1.3 By any appropriate means, mark and note the position and condition of all key structural elements to support evaluation of 6.11.1.

8.5.1.4 Using a rigid frame structure and an appropriately designed apparatus, apply a cyclical horizontal load of 27 lbf ± 2 lbf (120 N ± 9 N) to the geometric center of the top of each side/end assembly at a point no more than 1 in. from the top of the rail on the assembly being tested. The force shall be applied to the crib through a rigid 2 in. (51 mm) wide clamping device in both the inward and outward directions, a cycle being defined as the application of the 27 lbf force in each direction. The frequency shall be no less than 155 ± 5 cycles per minute. The total number of cycles shall be 9000.

NOTE 11—An appropriately designed apparatus for applying the 27 lbf to the crib assembly must be designed to maintain the 27 lbf for the duration of the cyclic testing. The resistance of the crib assembly may change with repeated cycling requiring a different deflection distance to achieve the constant application of 27 lbf.

8.5.1.5 Repeat steps 8.5.1.3 and 8.5.1.4 for all remaining side/end assemblies of the crib without retightening any of the fasteners.

8.5.1.6 Inspect the crib and the fasteners to ensure compliance with 6.11.

8.5.2 *Vertical Cyclic Test:*

8.5.2.1 The crib, including any accessories that are rigidly mounted to the crib, shall be assembled per the manufacturer's instructions except that any wheels or casters shall not be assembled. The testing in this section shall be conducted without casters. Items, such as drawers and hampers, when assembled in the manufacturer's recommended use positions, that are intended to move or slide and can be removed without the aid of tools shall be removed before testing.

8.5.2.2 The crib legs or base shall be restrained by an appropriate method to prohibit movement of the crib and shall not impede the application of the load or deflection of the side being tested for all phases of this test procedure.

8.5.2.3 By any appropriate means, mark and note the position and condition of all key structural elements to support evaluation of 6.11.1.

8.5.2.4 Using a rigid frame structure and an appropriately designed apparatus, apply a cyclical vertical load of 27 ± 2 lbf (120 ± 9 N) to the geometric center of the top of each side/end assembly at a point centered no more than 1 in. from the top of the rail on the assembly being tested. The force shall be applied to the crib through a rigid 2 in. (51 mm) wide clamping device in both the upward and downward directions, a cycle being defined as the application of the 27 lbf force in each direction. The frequency shall be no less than 155 ± 5 cycles per minute. The total number of cycles shall be 9000.

NOTE 12—An appropriately designed apparatus for applying the 27 lbf to the crib assembly must be designed to maintain the 27 lbf for the duration of the cyclic testing. The resistance of the crib assembly may change with repeated cycling requiring a different deflection distance to achieve the constant application of 27 lbf.

8.5.2.5 Repeat steps 8.5.2.3 and 8.5.2.4 for all remaining assemblies of the crib without retightening any of the fasteners.

8.5.2.6 Inspect the crib and the fasteners to ensure compliance with 6.11.

8.6 *Side or End Latch Test, or Both, for Rigid Sided Products:*

8.6.1 *Equipment*—Two 2 by 2-in. (50 by 50-mm) wood blocks for transmission of applied loads.

8.6.2 Remove casters from the unit. Secure the bottom of the unit in a manner that will prevent horizontal motion.

8.6.3 *Movable Side Latch Tests:*

8.6.3.1 Gradually apply within 5 s a vertically downward force of 60 lbf (270 N) through a hardwood block with 2-in. by 2-in. (50-mm by 50-mm) contact area to the upper horizontal rail of the unit side at a point that is 6 in. (150 mm) from the

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end of the movable side rail. While the 60-lbf (270-N) downward force is applied to the movable side, gradually apply within 5 s a 30-lbf (133-N) horizontal force in a direction parallel to the movable side. The point of application of this force is to be coincident with the horizontal extension of the longitudinal centerline of the movable side and 1 in. ± ½ in. (25 mm ± 13 mm) down from the top of the unit corner post or unit end panel for construction not incorporating unit corner posts (see Fig. A1.19). Maintain this horizontal force for an additional 30 s, then reverse its direction and maintain for an additional 30 s.

8.6.3.2 Repeat this procedure at the other end of the unit movable side and, if the unit has more than one movable side, perform the test at each end of each movable side.

8.6.3.3 Upon completion of the test, release the movable side latch and operate the movable side. Then raise the side and observe whether the latch automatically engages in the manner intended by the manufacturer.

8.6.4 *Hinged Drop Gate Latch Test:*

8.6.4.1 Place the hinged dropgate in the latched position. Through a hardwood block with contact area of 2 in. by 2 in. (50 mm by 50 mm), gradually apply within 5 s a force of 30 lbf (130 N) horizontally outward, perpendicular to, and at a point that is 6 in. ± ½ in. (152 mm ± 13 mm) from one end of the hinged dropgate upper rail. While this 30-lbf (130-N) force is applied to the dropgate, gradually apply within 5 s a 30-lbf (130-N) horizontal force in a direction parallel to the hinged side. The point of application of this force is to be coincident with the horizontal extension of the longitudinal centerline of the hinged dropgate and 1 in. ± ½ in. (25 mm ± 13 mm) down from the top of the unit corner post or unit end panel for construction not incorporating unit corner posts (see Fig. A1.19). Maintain this horizontal force for an additional 30 s, then reverse its direction and maintain for an additional 30 s.

8.6.4.2 Place the hinged dropgate in the latched position. Through a hardwood block with contact area of 2 in. by 2 in. (50 mm by 50 mm), gradually apply within 5 s a force of 30 lbf (130 N) horizontally inward, perpendicular to, and at a point that is 6 in. ± ½ in. (152 mm ± 13 mm) from one end of the hinged dropgate upper rail. While this 30-lbf (130-N) force is applied to the dropgate, gradually apply within 5 s a 30-lbf (130-N) horizontal force in a direction parallel to the hinged dropgate. The point of application of this force is to be coincident with the horizontal extension of the longitudinal centerline of the hinged dropgate and 1 in. ± ½ in. (25 mm ± 13 mm) down from the top of the unit corner post or unit end panel for construction not incorporating unit corner posts. Maintain this horizontal force for an additional 30 s, then reverse its direction and maintain for an additional 30 s.

8.6.4.3 Repeat the procedures at the other end of the hinged dropgate. If the unit has more than one hinged dropgate, perform this test at each end of each hinged dropgate.

8.6.4.4 Upon completion of the test, release the dropgate latch and lower the dropgate. Then raise the side and observe whether the latch automatically engages in the manner intended by the manufacturer.

8.6.5 *Test Procedure for Latches to Prevent Folding of a Foldable Side or End:*

8.6.5.1 With the product in the manufacturer's recommended use position, apply a 30-lbf (130-N) force at the center of the latch, in the direction the side folds. Gradually apply the force within 5 s and hold for an additional 30 s.

8.6.5.2 Repeat at other folding latch locations.

8.6.5.3 Upon completion of the test, inspect the latch for proper function.

8.7 *Mattress Support System Vertical Impact Test for Rigid Sided Products:*

8.7.1 *General*—This test consists of dropping a specified weight repeatedly onto a polyurethane foam pad covered in vinyl supported by the mattress support system. The test assists in evaluating the structural integrity of the non-full size crib assembly.

8.7.2 *Apparatus:*

8.7.2.1 A guided free-fall impacting system machine (which keeps the upper surface of the impact mass parallel to the horizontal surface on which the crib is secured) (see Fig. A1.20).

8.7.2.2 A 45-lb (20-kg) impact mass (see Fig. A1.21 and Fig. A1.22).

8.7.2.3 A 6-in. (150-mm) long gauge.

8.7.2.4 A 2-in. (50-mm) square gauge/spacer block.

8.7.2.5 A test mattress with a 3-in. (7.6-cm) thick sheet of polyurethane foam having a density of 1.9 lb/ft^3 ± 0.4 lb/ft^3 (30 kg/m^3 ± 6 kg/m^3), a 25 % indentation force deflection (IFD) of 32.4 lb ± 6.7 lb (144 N ± 30 N) and dimensions that shall not be more than 1 in. (25 mm) shorter and 1 in. (25 mm) narrower than the respective interior dimensions of the product, covered with a tight fitting 8 to 12 gauge vinyl material (tick). The suitability of the test mattress dimensions are to be determined by placing the mattress on the mattress support and pushing it fully over to one side. Measure the gap formed between the mattress and the crib side/end assemblies, which should not be greater than 1 in. (25 mm) in both the length and width.

8.7.3 *Procedure:*

8.7.3.1 Adjust the mattress support to its lowest position.

8.7.3.2 Put the test mattress in place. Do NOT use the mattress supplied with the non-full size crib. The same test mattress may be used for testing more than one crib if it meets the requirements of 8.7.2.5.

8.7.3.3 Secure the product to the horizontal test plane, remove the castors if supplied. Once the test has begun, no attempt shall be made at re-tightening fasteners which may have loosened because of vibration. The test must proceed without any corrective intervention of adjusting the height difference between the drop weight and mattress, until its completion, unless extensive damage, dislodging or deformation occurs during the course of the test, in which case the test shall be terminated.

8.7.3.4 Position the geometric centre of the test mattress below the geometric centre of the impact mass.

8.7.3.5 Adjust the distance between the top surface of the mattress and bottom surface of the impact mass to 6 in. (150 mm) (using the 6-in. (150-mm) long gauge described in 8.7.2.3) when the impact mass is in its highest position. Lock the impactor mechanism at this height and DO NOT adjust the

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height during impacting to compensate for any change in distance due to the mattress compressing or the mattress support deforming or moving during impacting.

8.7.3.6 Allow the 45-lb (20.0-kg) impact mass to fall freely 150 times at the rate of one impact every 4 (four) s. Load retraction shall not begin until at least 2 s after the start of the drop.

8.7.3.7 Repeat the step described in 8.7.3.6 at each corner of the mattress support, with the center of the impact mass 6 in. (150 mm) from the two sides forming the corners of the non-full size crib. To position the mass for a standard rectangular shaped non-full size crib place a 2-in. (50-mm) spacer block against one of the sides of the corner to be tested and move the impact mass until it touches the spacer block (see Fig. A1.23). Repeat this process for the other side that makes up the corner to be tested (see Fig. A1.24).

8.8 *Mattress Support System Test for Rigid Sided Products*—This test assists in evaluating the integrity of the attachment of the mattress support to the unit. A vertically upward force is applied to the mattress support to evaluate its attachment to the crib.

8.8.1 *Equipment:*

8.8.1.1 *Wood Corner Block (See* Fig. A1.25*)*—1½ in. by 3½ in. by 12 in. (40 mm by 90 mm by 300 mm).

8.8.2 *Test Procedure:*

8.8.2.1 Prevent upward motion of the unit during this test.

8.8.2.2 Conduct all procedures with no mattress in the unit.

8.8.2.3 If the mattress support system utilizes a common support design at all points of attachment, testing is required in only one corner. If more than one support design is used, each point of attachment utilizing a different design must be tested.

8.8.2.4 Apply the force with the mattress support in each of the adjustment positions.

8.8.2.5 Apply the 25-lbf (110-N) force to the mattress support through the wood corner block diagonally positioned such that the centerline of this wood corner block contacts the underside of the mattress support at points 6 in. ± ½ in. (150 mm ± 13 mm) from the corner of the support. (6 in. (150 mm) from the projected corner for a mattress support not having a square corner) (see Fig. A1.25).

8.8.2.6 Apply the 25-lbf (110-N) force gradually within a period of 5 s and maintain for an additional 10 s before releasing the force.

8.9 *Crib Side Test:*

8.9.1 *General*—This test consists of repeatedly impacting a crib side bottom rail by a specified weight. After completing the cyclic testing, structural integrity is tested by applying a static pull to the side assembly followed by a torque test of each spindle or slat.

8.9.2 *Apparatus for Crib Side Cyclic Test*—The apparatus for the cyclic test (see Fig. A1.26) includes the following:

8.9.2.1 A 30-lb (13.6-kg) weight.

8.9.2.2 A 0.375-in. (9-mm) thick 30 Type A durometer rubber pad large enough to cover the impact area.

8.9.2.3 Impactor with a width of 1 in. (25 mm) and sufficient length to extend across the full width of the bottom rail.

8.9.3 *Apparatus for Crib Side Static Test*—A 100-lb (45.4-kg) weight.

8.9.4 *Crib Side Cyclic Tests:*

8.9.4.1 The crib is to be assembled in accordance with the manufacturer's instructions except that casters shall not be installed on the crib.

8.9.4.2 Secure the bottom ends of the crib to eliminate horizontal motion at the base.

8.9.4.3 Allow the 30-lb (13.6-kg) weight to free-fall 3 in. (76 mm) 250 times at a rate of 4 ± 1 s/cycle such that it impacts directly upon the 0.375-in. (9-mm) thick rubber pad located on the top surface of the bottom rail between two adjacent spindles or slats as near the center of the rail as possible.

8.9.5 *Crib Side Static Test:*

8.9.5.1 Upon completion of the cyclic test, apply a weight of 100 lb (45.4 kg) at the point of impact testing while the side is supported on the top rail at a point vertically in line with the point of weight application.

8.9.5.2 The contact area for the load and reaction support shall be the same as the impact area previously defined.

8.9.5.3 Apply the weight gradually within a period of 5 s and maintain it for an additional 30 s.

8.9.6 *Crib Side Spindle/Slat Torque Test*—Apply a torque of 30 lbf-in. (3.4 N-m) at the midpoint in height of each spindle or slat.

8.10 *Spindle/Slat Static Load Strength*—Testing, as defined in this section, shall be the last in the sequence of testing performed upon a crib.

8.10.1 The spindle/slat static force test shall be performed with the spindle/slat assemblies removed from the crib and rigidly supported within 3 in. of each end of the upper and lower horizontal rails in a manner that shall not interfere with a spindle/slat deflecting under the applied force. For cribs incorporating foldable or moveable sides for purposes of easier access to the occupant, storage, or transport, or a combination thereof, each side segment (portion of side separated by hinges for folding) shall be tested separately.

NOTE 13—Rationale: During the development of the spindle/slat testing procedure, consideration wasn't given to testing crib sides that fold either for access to the occupant or for storage and transport. While the defined testing support requirements work adequately for a crib side with no moving segments, this method does not clearly define testing procedures for segmented sides.

8.10.2 Gradually, over a period of not less than 2 s nor greater than 5 s, apply an 80 lb force (355.8 N) perpendicular to the plane of the side at the midpoint between the top and bottom of the spindle/slat being tested. This force shall be applied through a force measuring device and contact area 1 ± 1⁄16 in. (25.4 ± 1.6 mm) wide by a length at least equal to the width of the spindle/slat being tested at the point of application. This force shall be maintained for 10 s. The force measuring device must be capable of recording the force at breakage, if breakage occurs during this test. This force measuring device must be capable of a maximum measurement resolution of 0.25 lbf (1.11 N).

8.10.3 Test, according to 8.10.2, 25 % (rounding up to the nearest percentage, if necessary) of all spindles/slats. Spindles/slats that offer the least resistance to bending based upon their

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geometry shall be selected to be tested within this grouping of 25 % except that adjacent spindles/slats shall not be tested.

8.10.4 Upon completion of testing as defined in 8.10.2 and 8.10.3, no spindle/slat shall have failed at an applied force less than or equal to 60 lbf. If no more than one spindle/slat fails and that failure occurs only as the result of an applied force greater than 60 lbf, then an additional 25 % of spindles/slats shall be tested per 8.10.2 and 8.10.3. During testing of this second 25 %, any spindle/slat failure (at or below 80 lbf) shall constitute failure of the test.

8.10.5 End vertical rails that are joined between the spindle/slat assembly top and bottom rails are not considered spindles/slats and do not require testing to this procedure.

8.11 *Side Deflection and Strength Tests for Mesh/Fabric Products:*

8.11.1 *Equipment*—Wood block, 6 in. by 6 in. (150 mm by 150 mm).

8.11.2 *Test Method:*

8.11.2.1 Perform test described in 8.11.2.2 and 8.11.2.3 in sequence at the same location without refurbishing or adjusting the test sample.

8.11.2.2 When the unit sides fully erected, gradually apply a 50-lbf (220-N) force vertically downward over a 2-in. (50-mm) length of the top edge of side and hold for 10 s. Remove the force and measure the permanent deflection. Perform the test at locations deemed to be the weakest or the most likely to fail.

8.11.2.3 Place a 6 in. by 6-in. (150 mm by 150-mm) wooden block on the unit floor 1 in. ± ½ in. (25 mm ± 13 mm) from the center of the top edge of the side positioned so the vertical centerline is in line with the point of application of the 30-lbf (130-N) force. Center a 10-lb (4.5-kg) weight on the wooden block. Gradually apply a 30-lbf (130-N) force vertically downward over a 2 in. (50 mm) length of the side top edge. Maintain the force for 10 s while measuring the height of the side from the edge of the unit floor to the point of application of the force. Perform the test at locations deemed to be the weakest or the most likely to fail.

8.11.2.4 Erect the unit in the manufacturer's use position against a wall or in a fixture as shown in Fig. A1.27. Apply a force of 100 lbf (450 N) over a 2-in. (50-mm) length of the top rail as close to center as possible. The force shall be applied at 45° ± 3° to the plane of the unit floor, and 90° ± 3° to the unit side rail. Apply a force gradually within 5 s and maintain for additional 10 s.

8.12 *Floor Strength Test for Mesh/Fabric Products:*

8.12.1 *Equipment*—Two wood blocks, 6 by 6 in. (150 by 150 mm).

8.12.2 *Test Method:*

8.12.2.1 Remove cushions that are not part of the floor or mattress support. Place the wood blocks 6 in. ± ½ in. (150 mm ± 13 mm) apart. Place a 50-lb (23-kg) weight on one wood block and a 30 lb (14 kg) weight on the other wood block. Maintain for 60 s. Perform the test in those locations deemed to be the weakest or the most likely to fail. Remove the loads and check for structural failure.

8.12.2.2 Remove cushions that are not part of the floor or mattress support. Allow a 30-lb (14-kg) rigid weight to drop freely from a height of 3 in. ± ½ in. (76 mm ± 13 mm) onto a 6 in. by 6-in. (150 mm by 150-mm) wood block. Conduct the drop test 50 times in the same place with no more than 10 s between drops. Perform the test in those locations deemed to be the weakest or the most likely to fail.

8.13 *Locking Mechanism Test:*

8.13.1 *Dropgate Locking Device Test Method*—With the dropgate rail of the units in its uppermost position, gradually apply a force of 10 lbf (45 N) to the locking mechanism in the direction tending to unlock it. The locking mechanism shall not unlock until the force of 10 lbf (45 N) has been exceeded.

8.13.2 *Folding Latch Test Method*—With the product in the manufacturer's recommended use position, gradually apply a force of 10 lbf (45 N) to the locking mechanism in the direction tending to unlock it. The locking mechanism shall not unlock until the force of 10 lbf (45 N) is exceeded.

8.14 *Mesh Opening Test:*

8.14.1 *Equipment:*

8.14.1.1 *Steel Rod*—¼ ± 0.005 in. (6.3 ± 0.1 mm) diameter with full-radius tip.

8.14.2 *Test Method*—With the unit and the side rails in their fully erected position, gradually apply a force of 5 lbf (22 N) perpendicular to the plane of the mesh opening using the rod specified in 8.14.1.1. Perform the test in those locations deemed to be the weakest or the most likely to fail.

8.15 *Test for Strength of Mesh and Integrity of Attachment:*

8.15.1 *Equipment*—Wood block, 6 by 3 in. (150 by 75 mm).

8.15.2 *Test Method:*

8.15.2.1 Assemble the product in accordance with the manufacturer's instructions. Place the product on its side so that its side lies in a horizontal plane. Secure the product so that it does not move or collapse when placed on its side. Any blocking or support necessary to maintain the position described may be used if the blocking does not act directly on the frame of the side under test.

8.15.2.2 Place the wooden block on the side of unit with 6 in. (150 mm) sides running parallel to the top rail.

8.15.2.3 Gradually apply a force of 20 lbf (90 N) on the wood block over 5 s and maintain for an additional 10 s. Gradually remove the force over 1 s.

8.15.2.4 Perform the test specified in 8.15.2.3 ten times, allowing 10 s recovery time between tests.

8.15.3 The loading procedure described in 8.15.2.3 and 8.15.2.4 shall be applied to three areas of each side of the product as follows:

8.15.3.1 At the geometrical center of the side or, where exterior framing interferes with the test, as close as possible to the geometric center;

8.15.3.2 At the top rail of the side, with the closer 3 in. (75 mm) edge of the load block between 1 in. and 2 in. (25 mm and 50 mm) from the center of the rail at the center line of the top rail; and

8.15.3.3 At the bottom rail with the closer 3 in. (75 mm) edge of the load block between 1 in. and 2 in. (25 mm and 50 mm) from the center of the rail at the center line of the top rail.

8.16 *Mesh/Fabric Attachment Strength Test Method:*

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