



Standard Consumer Safety Specification for High Chairs¹

This standard is issued under the fixed designation F404; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

INTRODUCTION

This consumer safety specification addresses high chair incidents that were identified by the U.S. Consumer Product Safety Commission (CPSC).

CPSC identified injuries to children associated with tray disengagement, falls resulting when children stood up on the seat of a high chair, entrapment between the tray and the seat, and tipover. By far the most common injury resulted from children falling when they were able to stand up on the seat of the high chair because they were not secured by the restraining system. In response to the incident data developed by the Commission, this consumer safety performance specification attempts to minimize the above listed problems.

This consumer safety performance specification does not cover high chairs that are either blatantly misused or are used in a careless manner that disregards the warnings and safety instructions that are provided with each high chair.

This consumer safety performance specification is written within the current state-of-the-art of high chair technology. It is intended that this specification will be updated whenever substantive information becomes available that necessitates additional requirements or justifies the revision of existing requirements.

1. Scope

1.1 This consumer safety specification covers the performance requirements and methods of test to ensure the satisfactory performance of the high chair.

1.2 This consumer safety specification is intended to minimize injuries to children resulting from normal usage and reasonably foreseeable misuse or abuse of high chairs.

NOTE 1—This consumer safety specification is not intended to address accidents and injuries resulting from the interaction of older children with children in the high chair or the accidents resulting from abuse and misuse by persons over three years of age.

1.3 For purposes of this consumer safety specification, a high chair is a free standing chair that elevates a child to standard dining table height. The high chair is made for the purpose of holding a child, up to 3 years of age, who can remain in a sitting position due to the child's own coordination, and normally for the purposes of feeding or eating. A high chair may be height adjustable and include a reclined position for infants not able to remain in a sitting position due to the child's own coordination.

¹ This consumer safety specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.16 on Highchairs, Hook-On Chairs and Expandable Gates.

Current edition approved Jan. 1, 2014. Published February 2014. Originally approved in 1975. Last previous edition approved in 2013 as F404 – 13a. DOI: 10.1520/F0404-14.

1.4 No high chair 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 requirements contained herein.

1.5 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.

1.6 The following precautionary caveat pertains only to the test methods portion, Section 7, 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 and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 2—This consumer safety specification includes the following sections:

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2. Referenced Documents

2.1 ASTM Standards:²

- D3359 Test Methods for Measuring Adhesion by Tape Test
- F833 Consumer Safety Performance Specification for Carriages and Strollers
- F963 Consumer Safety Specification for Toy Safety

2.2 Federal Regulations:³

- 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:
- 16 CFR 1500.48 Technical Requirements for Determining a Sharp Point in Toys or Other Articles Intended for Use by Children Under Eight Years of Age
- 16 CFR 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
- 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

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *conspicuous, adj*—label that is visible, when the high chair is in a manufacturer's recommended use position, to a

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

person standing near the high chair at any one position around the high chair but not necessarily visible from all positions.

3.1.2 *double action release mechanism, n*—mechanism requiring either two consecutive actions, the first of which must be maintained while the second is carried out or two separate and independent locking mechanisms that must be activated simultaneously to fully release the tray.

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

3.1.4 *front torso support, n*—a barrier extending horizontally across the seat of the high chair that is the primary support intended to restrict forward movement of the occupant's torso when the tray is removed and creates a completely or partially bounded opening in front of the occupant.

3.1.5 *latch release surface, n*—any surface on the tray latch release mechanism that results in the tray releasing from its adjustment position when a force is applied perpendicular to that surface.

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

3.1.7 *nonpaper 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.

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

3.1.9 *paper label, n*—any label material (except fabric) that tears without the aid of tools and leaves a fibrous edge.

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

3.1.11 *seating surface, n*—seat support surface for the occupant that exists between the side surfaces, seat back surface, and the INNER SURFACE of the passive crotch restraint.

3.1.11.1 *Discussion*—For seats with open sides, the seat side surfaces are defined by a vertical plane tangent to the inside surface of the high chair armrest.

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

3.1.13 *tray latch release mechanism, n*—mechanism for releasing the latch that secures a tray onto a high chair or into an adjustment position, or both.

4. Calibration and Standardization

4.1 All testing shall be conducted on a concrete floor that may be covered with 1/8-in. (3-mm) thick vinyl flooring cover, unless test instructs differently.

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

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

4.4 The product to be tested shall be in a room with an ambient temperature of $73 \pm 9^{\circ}\text{F}$ ($23 \pm 5^{\circ}\text{C}$) for at least 1 h prior to testing. Testing shall then be conducted within this temperature range.

5. General Requirements

5.1 There shall be no hazardous sharp edges or points as defined by 16 CFR 1500.48 and 16 CFR 1500.49 before or after testing in accordance with this consumer safety specification.

5.2 There shall be no small parts, as defined by 16 CFR 1501, before testing or liberated as a result of testing to this specification.

5.3 Before the application of any test methods, any exposed wood parts shall be smooth and free of splinters.

5.4 *Latching or Locking Mechanisms*—Any unit that folds shall have a latching or locking device or other provision in a design that will prevent the unit from unintentionally folding when properly placed in the manufacturer's recommended use position. During and upon completion of the testing in accordance with 7.1, the unit shall remain in its manufacturer's recommended use position. If a unit is designed with a latching or locking device, that device shall remain engaged and operative after testing.

5.5 Labeling:

5.5.1 Warning labels, whether paper or non-paper, shall be permanent when tested per 7.9.1 – 7.9.3.

5.5.2 Warning statements applied directly onto the surface of the product by hot stamping, heat transfer, printing, wood burning, etc. shall be permanent when tested per 7.9.4.

5.5.3 Non-paper labels shall not liberate small parts when tested in accordance with 7.9.5.

5.6 *Openings*—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. 1). The product shall be evaluated in all manufacturer's recommended use positions.

5.7 Toy components provided with or attached to the high chair shall comply with the requirements of Consumer Safety Specification F963.

5.8 All paints and surface coatings on the product shall comply with 16 CFR 1303.

6. Performance Requirements

NOTE 3—The loading in this section may be simplified by the use of a simple test frame that will permit the loads to be applied by dead weights operating over a ball bearing pulley through a rope. Vertical force tests are greatly aided with the use of an overhead pulley.

6.1 *Protective Components*—If the child can grasp protective 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 7.2. All protective components that are accessible to a child sitting in the high chair or accessible to a child from any position around the high chair shall be evaluated.

6.2 *Removable Tray or Front Torso Support Performance Integrity*—All removable trays and front torso supports shall remain functional with respect to the chair and exhibit no sharp points, sharp edges, or small parts when subjected to a drop test in accordance with 7.3. A tray or front torso support is considered removable if it can be removed from the high chair without the use of tools (for example, screw driver or wrench).

6.3 *Tray or Front Torso Support Performance – Pull Test*—The tray or front torso support shall not become disengaged or dislocated from its original adjustment position, when tested in accordance with 7.4 and 7.5. Components that do not function as a front torso support such as trays, tray inserts, or snack trays are exempt from this requirement.

6.4 *Static Load*—A chair shall support static loads without causing any hazardous conditions as identified within this consumer safety specification. Tests shall be conducted in accordance with 7.6.

6.5 *Stability*—A chair shall not tip over when forces are applied in accordance with 7.7.

6.6 *Exposed Coil Springs*—Any exposed coil spring which is accessible to the occupant, having or capable of generating a space between coils of 0.210 in. (5.3 mm) or greater during static load testing in accordance with 7.6 shall be covered or otherwise designed to prevent injury from entrapment.

6.7 *Scissoring, Shearing, and Pinching*—A high chair, when in the manufacturer's recommended use position, shall be designed and constructed so as 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 can cause injury exists when the edges of the rigid parts admit a probe greater than 0.210 in. (5.3 mm) and less than 0.375 in. (9.5 mm) in diameter at any accessible point throughout the range of motion of such parts.

6.8 Restraint System:

6.8.1 A restraint system shall be provided to secure a child in the seated position in any of the manufacturer's recommended use positions.

6.8.1.1 The restraint system shall include both waist and crotch restraint designed such that the crotch restraint's use is mandatory when the restraint system is in use.

6.8.2 The restraint system and its closing means (for example, buckle) shall not break, separate, or permit removal of the CAMI test dummy from the high chair when tested in accordance with 7.8.

6.8.2.1 If during test in 7.8.5.1, the posterior of the test dummy is pulled past the front edge of the seat, the dummy shall be considered removed.

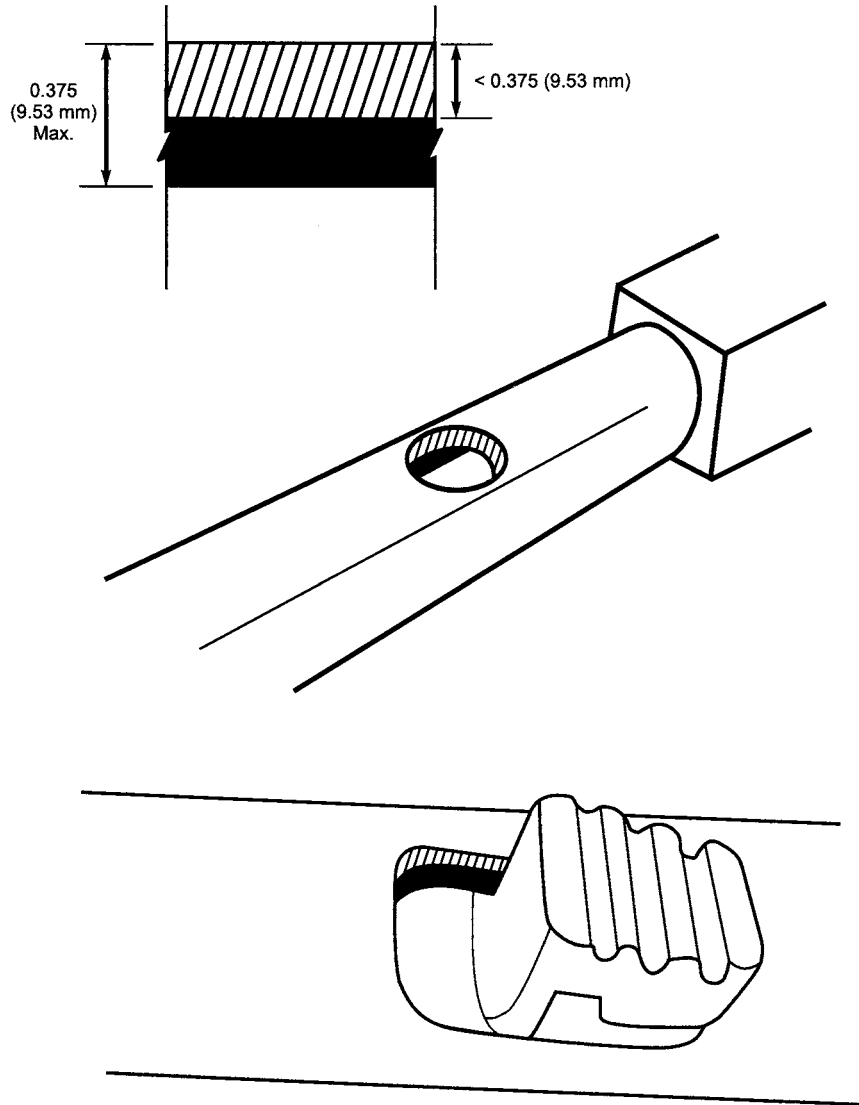


FIG. 1 Opening Example

6.8.2.2 If during test in 7.8.5.3, the dummy with the force applied reaches a vertical position with the bottom of its feet touching or off the seat, the dummy shall be considered removed.

6.8.3 The waist restraint shall be capable of adjustment with a positive, self-locking mechanism that is capable, when locked, of withstanding the forces of tests in 7.8 without allowing restraint movement or slippage of more than 1 in. (25.4 mm).

6.8.4 A connecting means and adjustment means for the waist restraint shall be capable of usage independent of one another. The connecting means shall not be an adjustment means but may have one integrally attached to it.

6.8.5 Before shipment, the restraint system should be completely attached to the high chair in the location for use in at least one of the manufacturer's recommended use position(s) and in such a manner as to not become detached through normal use.

6.9 Passive Crotch Restraint System:

NOTE 4—A passive crotch restraint required by this section does not meet the restraint system requirement of 6.8.1.1, which requires a crotch restraint as part of the restraint system.

6.9.1 High chairs that have a completely bounded opening in front of the occupant in any position shall also have a passive crotch restraint in all such positions.

6.9.1.1 There shall be no vertical gap between the passive crotch restraint and either the tray, front torso support, or seating surface that allows free passage of a 1.5-in. (38-mm) diameter by 3-in. (76-mm) long rod from one leg opening to the other.

6.9.1.2 Adjust the seat back to the most upright position and the passive crotch restraint to the position furthest from the seat back. The distance between the front surface of the noncompressed seat back and the passive crotch restraint shall be less than 8.5 in. (216 mm) when measured horizontally 2.0 in. (50 mm) above the lowest point on the noncompressed seating surface.

6.9.1.3 The leg openings on each side of the passive crotch restraint shall not allow complete passage of the wedge block when tested in accordance with 7.11.

6.10 Structural Integrity:

6.10.1 During and upon completion of the testing in accordance with 7.10, the high chair shall comply with all of the following:

6.10.1.1 The high chair shall not exhibit an instantaneous change in the height of the occupant seating surface above the floor of more than 3 in. (75 mm) during one cycle of the weight drop. During and after a change in the height of the seating surface, the high chair must comply with the requirements for openings as defined in 6.6 and scissoring, shearing, and pinching as defined in 6.7.

6.10.1.2 There shall be no breakage of any structural component.

6.10.1.3 Latching or locking devices which prevent folding of the high chair shall remain engaged.

6.10.1.4 The angle of the occupant seating surface relative to the floor shall not change more than 10°.

6.11 Tray Latch Release Mechanisms:

6.11.1 High chairs that have completely bounded leg openings in front of the occupant, on each side of a passive crotch restraint, when the tray is removed are exempt from the following tray latch release mechanism requirements.

6.11.2 Tray latch release mechanisms located on the front of the tray or forward of the occupant shall comply with 6.11.2.1 or 6.11.2.2 or 6.11.2.3. Tray latch release mechanisms which only allow for a change in adjustment position of the tray and do not allow the tray to be detached from any attachment point to the high chair and trays on high chairs with a front torso support are exempt from the requirements in this section.

6.11.2.1 Latch release surfaces on a tray latch release mechanism shall be inaccessible by the foot of the occupant as defined in Item 1 (below) or comply with Item 2.

(1) The bottom surface of the leg/foot probe assembly, Fig. 2, shall not contact any latch release surface on the tray latch release mechanism when tested per 7.12.1.

(2) If a latch release surface is contactable by the bottom of the foot on the leg/foot probe assembly, the angle between Plane “A” on the foot and Plane “B” at the lower end of the leg when tested per 7.12.2 shall be 30° or greater (see Fig. 3).

6.11.2.2 The direction to actuate the tray latch release mechanism must push toward the occupant.

6.11.2.3 The tray latch release mechanism is a double action release mechanism.

6.11.3 Tray latch release mechanisms located at the side of a tray shall comply with 6.11.3.1, 6.11.3.2, 6.11.3.3, or 6.11.3.4.

6.11.3.1 For single action tray latch release mechanisms, the tray shall not become detached from the high chair in any latching position when tested in accordance with 7.13. A change in the adjustment position of the tray is allowed provided that the tray cannot be detached from either side of the high chair.

6.11.3.2 Each tray latch release mechanism shall be a double action release mechanism. For purposes of this requirement, each tray latch release mechanism is to be considered independently.

6.11.3.3 Two or more tray latch release mechanisms are interdependent such that the tray cannot be fully released from either side of the high chair without actuating at least two tray latch release mechanisms. The interconnection must require either two consecutive actions, the first of which must be maintained while the second is carried out or two separate and independent actions that must be carried out simultaneously to fully release the tray. An attempt to actuate any one of the tray latch release mechanisms independently shall not allow either side of the tray to fully release from the high chair.

6.11.3.4 Tray latch release mechanism shall not be visible to the occupant and the direction of release mechanism must be no less than 85° from the direction of tray release or removal. Visibility is to be determined when the seat is in the upright position and tray is in any manufacturer’s use position. A tray latch release mechanism is considered not visible to the occupant if the latch is flush to or recessed back from the plane perpendicular to the outer edge of the tray in the area of the tray latch release mechanism.

6.12 Side Containment—Completely bounded openings in the surfaces that act as the sides of the seating area that are below the top surface of the tray and above the seat bottom surface shall not allow complete passage of the wedge block when tested in accordance with 7.14.

7. Test Methods

NOTE 5—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.

7.1 Locking Mechanisms:

7.1.1 Erect the high chair in accordance with the manufacturer’s instructions.

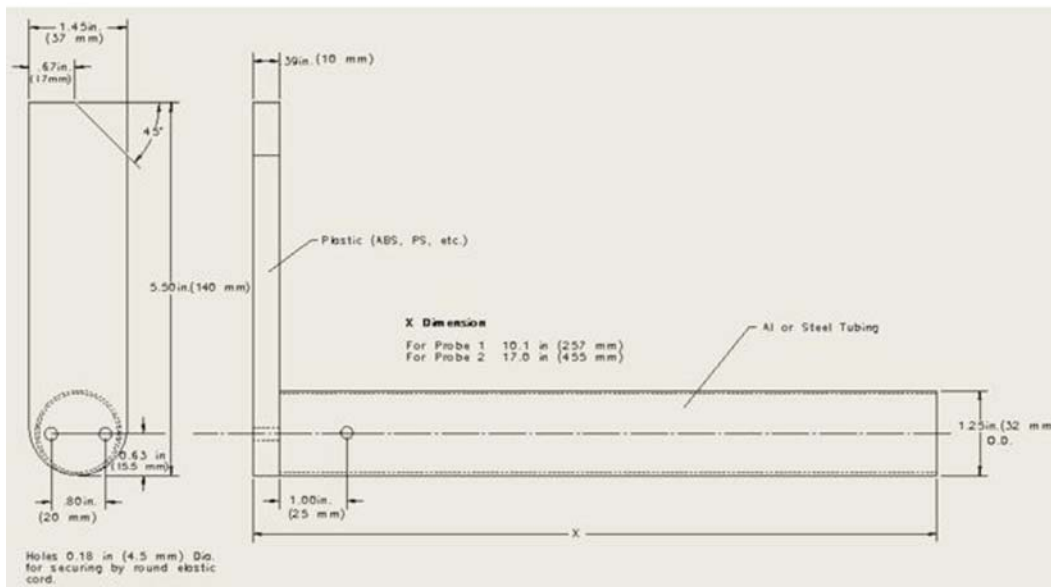
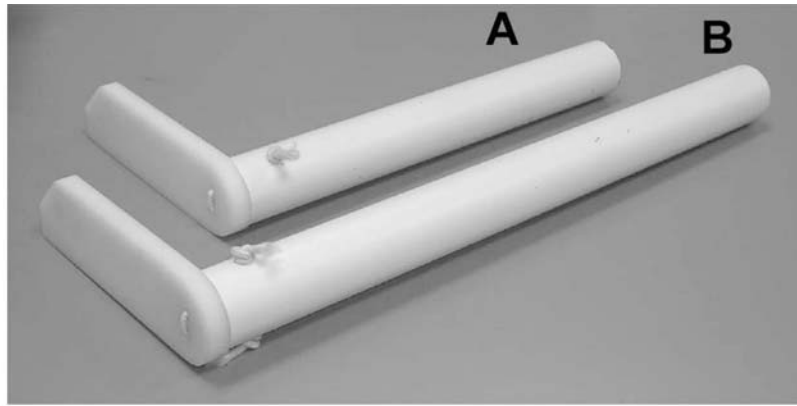
7.1.2 Secure the chair so that the normal folding motion is not impeded.

7.1.3 Apply a force of 45 lbf (200 N) to the high chair in the direction normally associated with folding the high chair. Apply the force on a 2 by 2-in. (50 by 50-mm) wood block at the location deemed the most likely to cause failure. Apply the force gradually over a 5 s period and maintain for an additional 10 s before releasing the force.

7.1.4 Perform this procedure five times within a 2 min period.

7.2 Protective Components:

7.2.1 Test all components in accordance with each of the following methods in the sequence listed.



NOTE 1—Leg/Foot Size Rationale:

- Foot Breadth = 1.5 in. (37 mm) (6 to 8 month 95th percentile)
- Foot Length = 5.5 in. (140 mm) (20 to 23 month 95th percentile)
- Foot Height = 0.39 in. (10 mm)
- Leg Length A (Rump to Sole) = 10.1 in. (257 mm) (6 to 8 month 5th percentile)
- Leg Length B (Rump to Sole) = 17.9 in. (455 mm) (20 to 23 month 95th percentile)
- Ankle Breadth = 1.22 in. (31 mm) (8 month 5th percentile – tube diameter)

NOTE 2—Foot dimensions are very close to the probe used in EN1930 (Template for Footholds) 1.4 by 4.7 by 0.39 in. (35 by 120 by 10 mm).

FIG. 2 Leg/Foot Probe

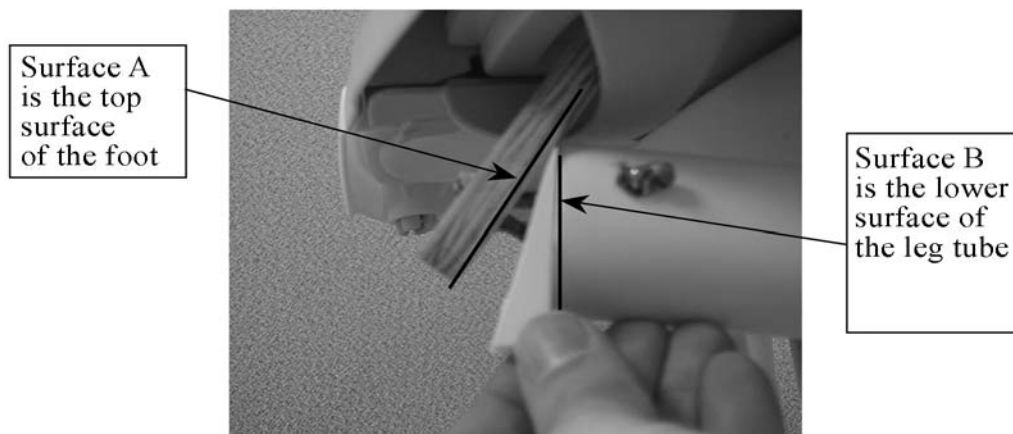


FIG. 3 30° Angle Block

15 lb Max TENSION

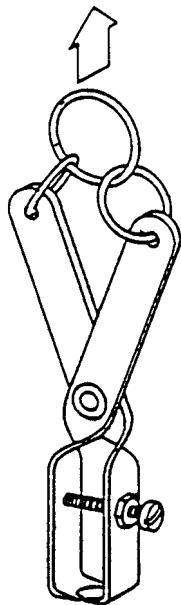


FIG. 4 Tension Test Adapter/Clamp

7.2.2 Secure the high chair so that it cannot move during the performance of the following tests.

7.2.3 *Torque Test*—Apply a torque of 4 lbf-in. (0.5 N · m) gradually within a period of 5 s in a clockwise direction until a rotation of 180° from the original position has been attained or 4 lbf-in. (0.5 N · m) has been reached. Maintain the torque or maximum rotation for an additional 10 s. Then remove the torque and permit the test components to return to a relaxed condition. Then repeat this procedure in the counter clockwise direction.

7.2.4 *Tension Test:*

7.2.4.1 Attach a force gauge to the component cap, sleeve or plug by means of any suitable device. For components that cannot reasonably be expected to be grasped between thumb and forefinger, or teeth, on their outer diameter but have a gap of 0.04 in. (1.0 mm) or more between the rear surface of the component and the structural member of the high chair to which they are attached, a clamp such as shown in Fig. 4 may be a suitable device.

7.2.4.2 Be sure the attachment device does not compress or expand the component to hinder removal of the component.

7.2.4.3 Gradually apply a 15-lbf (67-N) force in the direction that would normally be associated with the removal of the component. Apply the force within 5 s and maintain for an additional 10 s.

7.3 *Tray or Front Torso Support – Drop Test*—From a height of 36 in. (900 mm) measured from the center point of the tray or front torso support, drop any removable tray and any removable front torso support on vinyl tile over concrete flooring once on each of four different surfaces, one surface of which shall include the attaching mechanism. Each removable tray and front torso support shall be tested separately and independently.

NOTE 6—For the purposes of this test only, the center point of the tray or front torso support coincides with the center of the smallest rectangle

that circumscribes the component in the plane of the component.

7.4 *Tray or Front Torso Support Disengagement – Horizontal Pull Test:*

7.4.1 Perform this test on either the tray of a high chair without a front torso support or on the front torso support of a high chair. If the tray or front torso support is required to be tested in accordance with 6.2, perform this test on a tray or front torso support that has been tested in accordance with 7.3.

7.4.2 *Horizontal Pull Test (Front and Rear):*

7.4.2.1 Secure the chair in its normal standing position so that all legs have contact with the floor and so that it cannot move in the direction of the force being applied. For high chairs without a front torso support, attach the tray to the high chair and adjust into the manufacturer's recommended use position deemed most likely to fail. For high chairs with a front torso support, attach the front torso support to the high chair and adjust into the manufacturer's recommended use position deemed most likely to fail.

7.4.2.2 Attach a test device to the center front or back of the tray or front torso support in such a manner that the force will be exerted on a pad not exceeding 2 in. (51 mm) in any direction. For high chairs with a front torso support, remove the tray prior to performing this test. Other components such as tray inserts, or snack trays, should be removed prior to performing this test.

7.4.2.3 Gradually apply a horizontal force of 45 lbf (200 N) to the tray within a 5 s period and maintain for an additional 10 s.

7.4.2.4 Repeat this procedure four more times for a total of five repetitions in both front and rear directions for all adjustable tray positions.

7.4.3 *Horizontal Pull Test (Sides):*

7.4.3.1 Perform this test under the same conditions as in 7.4.2.1 with the chair affixed in a position so that the horizontal force of 45 lbf (200 N) is applied perpendicularly to the center of a side of the tray or the front torso support within 5 s and maintain for an additional 10 s. The tray or front torso support shall be placed in the manufacturer's recommended use position deemed most likely to cause failure.

7.4.3.2 Repeat this procedure four more times for a total of five repetitions on each side of the tray.

7.5 *Tray or Front Torso Support Disengagement – Vertical Pull Test*—Secure the chair in its normal standing position so that all legs have contact with the floor and so that it cannot move in the direction of force being applied. For high chairs without a front torso support, attach the tray to the high chair and adjust into the manufacturer's recommended use position deemed most likely to fail. For high chairs with a front torso support, attach the front torso support to the high chair and adjust into the manufacturer's recommended use position deemed most likely to fail. Other components that do not function as a front torso support, such as trays, such as tray inserts, or snack trays, should be removed prior to performing this test.

7.5.1 *Vertical Pull Test (Rear):*

7.5.1.1 Attach a test device to the rear center of the tray or front torso support in such a manner that the force will be exerted on a pad not exceeding 2 in. (51 mm) in any direction.

7.5.1.2 Gradually apply a vertically upward force of 45 lbf (200 N) at the rear of the tray within 5 s and maintain for an additional 10 s.

7.5.1.3 Repeat this procedure four more times for a total of five repetitions.

7.5.2 Vertical Pull Test (Sides):

7.5.2.1 For high chairs without a front torso support, attach the tray to the high chair. For high chairs with a front torso support, attach the front torso support to the high chair. Attach a test device to the side of the tray or front torso support at the center line of the locking mechanism, attachment point, or centered between the two attachment points that are spaced the farthest distance apart if more than one attachment point is used to secure the tray or front torso support on the side being tested in such a manner that the force will be exerted on a pad not exceeding 2 in. (51 mm) in any direction. Other components that do not function as a front torso support, such as trays, such as tray inserts, or snack trays, should be removed prior to performing this test.

7.5.2.2 Gradually apply a vertically upward force of 45 lbf (200 N) at the side of the tray within 5 s and maintain for an additional 10 s.

7.5.2.3 Repeat this procedure four more times for a total of five repetitions on each side of the tray.

7.6 Static Load Testing:

7.6.1 Seat Static Load Test:

7.6.1.1 Secure the chair in an upright position with all legs on the floor.

7.6.1.2 Place a 6 by 6-in. (150 by 150-mm) wood block on the center of the seat.

7.6.1.3 Gradually apply a static load of 100 lb (45 kg) on the wood block within a period of 5 s and maintain for an additional 60 s.

7.6.2 Step/Footrest Static Load Test:

7.6.2.1 Secure the chair in an upright position with all legs on the floor. If the step or footrest is adjustable, adjust it to the lowest position.

7.6.2.2 Place a 3 by 6-in. (75 by 150-mm) wood block on the center of the step or footrest.

7.6.2.3 Gradually apply a static load of 50 lb (22.7 kg) on the wood block within a period of 5 s and maintain for an additional 60 s.

7.6.3 Tray Static Load Test:

7.6.3.1 Secure the chair in an upright position with all legs on the floor. If the tray is adjustable, adjust it to the rear position, closest to the high chair seat back.

7.6.3.2 Place a 3 by 6-in. (75 by 150-mm) wood block at the center top surface of the tray.

7.6.3.3 Gradually apply a static load of 50 lb (22.7 kg) on the wood block within a period of 5 s and maintain for an additional 60 s.

7.7 Stability Testing:

7.7.1 Stability with Child in Chair:

7.7.1.1 Place the chair in an upright position with all legs on the floor. Attach the tray in the rear position, closest to the high chair seat back.



NOTE 1—This CAMI Infant Dummy was constructed in accordance with the Department of Transportation Specification dated April 29, 1975.

FIG. 5 CAMI Infant Dummy—Mark II

7.7.1.2 Place an angle or bar on the floor against the leg or legs in a manner that will prevent the chair from sliding on the floor, but will not prevent it from tipping.

7.7.1.3 Center a weight of 40 lb (18.1 kg) on the seat on a 6 by 6-in. (150 by 150-mm) wood block and affix it to the seat in such a manner that the weight will not move in relation to the seat.

7.7.1.4 Apply a horizontal force of 18 lbf (80 N) at the center front edge of the tray at the uppermost surface of the tray. Apply the horizontal force perpendicular to the front plane of the high chair and in a direction that is outward from the center of the high chair. Gradually apply the force over a period of 5 s.

7.7.1.5 Apply a horizontal force of 14 lbf (62 N) at the center of each arm of the high chair at the uppermost surface of the tray or arm, if a tray is not provided. Apply the horizontal force perpendicular to the side plane of the high chair and in a direction that is outward from the center of the high chair. Gradually apply the force over a period of 5 s.

7.7.1.6 Apply a horizontal force of 14 lbf (62 N) at the center of the seat back at the height of the uppermost surface of the tray. Apply the horizontal force perpendicular to the rear plane of the high chair and in a direction that is outward from the center of the high chair. Gradually apply the force over a period of 5 s.

7.7.1.7 For high chair designs that do not include a tray, conduct stability testing in 7.7.1.4 and 7.7.1.6 by applying the horizontal force on the outermost member at a height estimated to be the uppermost surface of a tray.

7.7.2 Stability with Child Climbing into Chair—With the tray removed, extend the footrest to its furthest forward adjustable position. Gradually apply a static load of 40 lbf (178 N) within 5 s at a position not to exceed 1 in. (25 mm) from the front edge of the footrest on a pad not exceeding 2 in. (51 mm)

Notes:

1. Material - 1 inch polyester, nylon, polypropylene, or equivalent webbing
2. All dimensions are in inches. Will add metric equivalent.
3. Tolerance is $\pm 1/4$ inch unless otherwise specified.

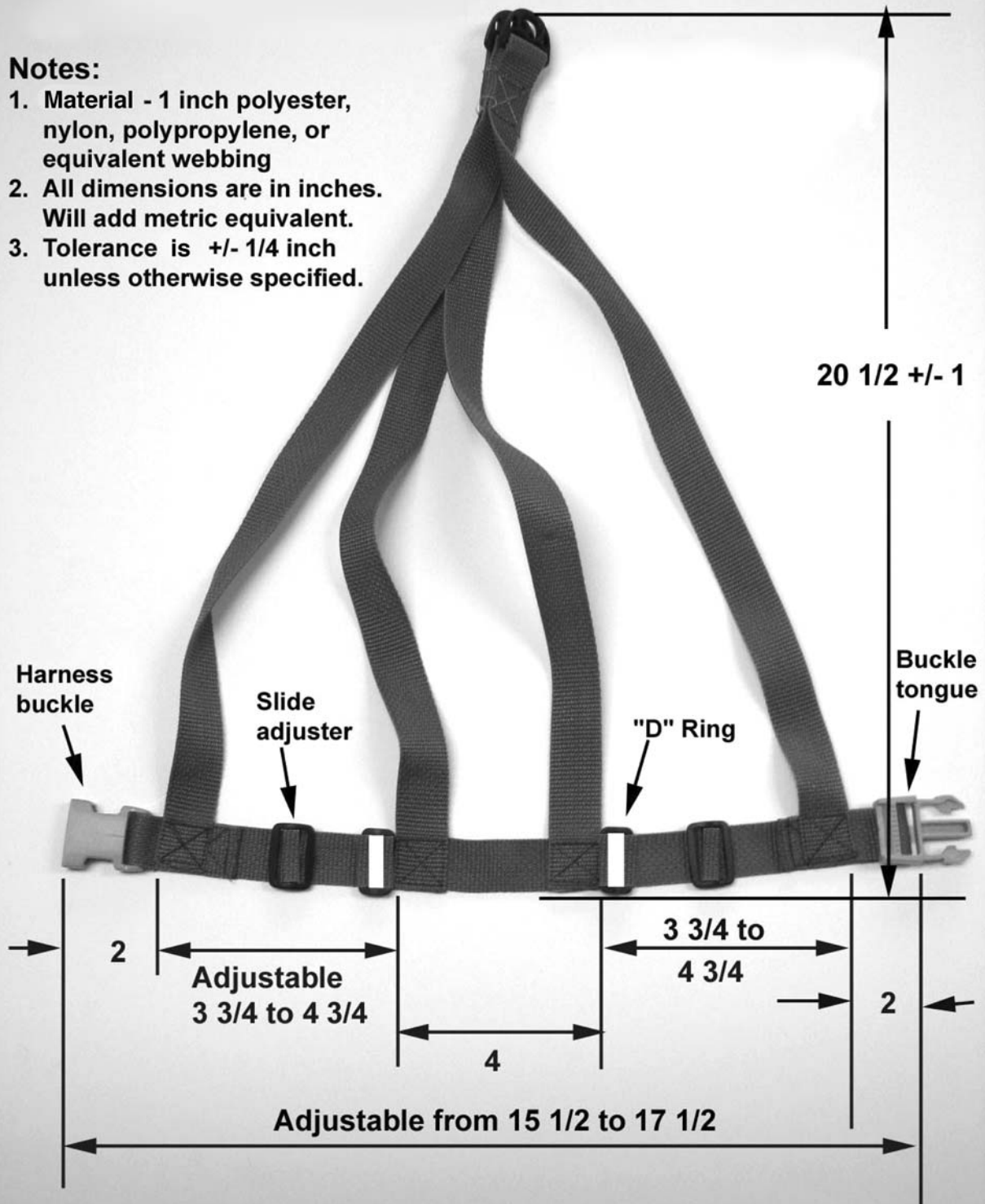


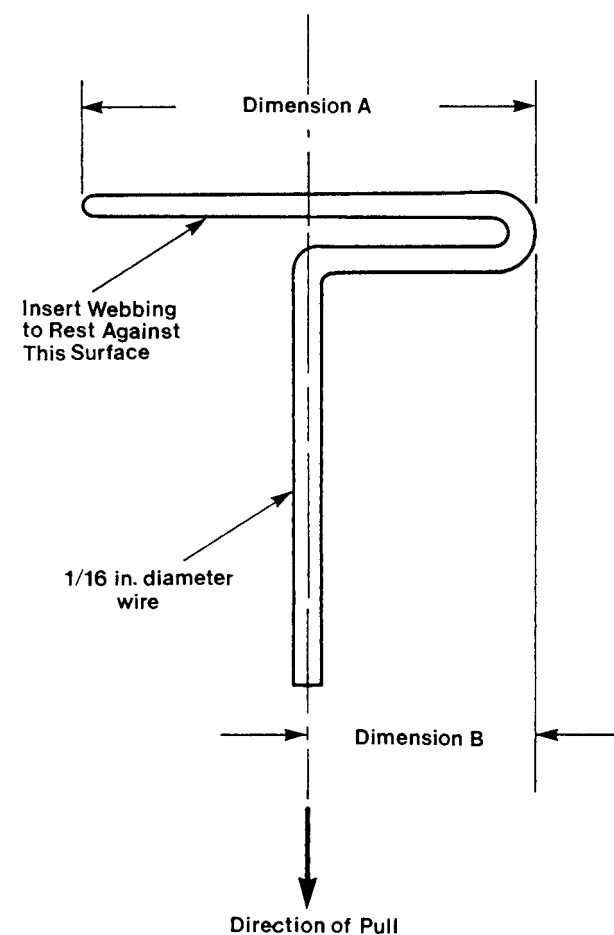
FIG. 6 Six-Month-Old CAMI Dummy Restraint System Test Harness

in any direction. If the chair has no footrest, gradually apply the static load of 40 lbf (178 N) to the forward most horizontal frame member.

7.8 Restraint System Retention Test:

7.8.1 Secure the high chair so it cannot move.

7.8.2 Place a restraint system test harness (see Fig. 6) on a



NOTE 1—Dimension A—Width of webbing plus 1/4 in.

NOTE 2—Dimension B—One half of Dimension A.

FIG. 7 Webbing Tension Pull Device

CAMI Infant Dummy Mark II.⁴ Position the horizontal belt just below the arms, and adjust the horizontal belt snugly around the torso.

7.8.3 Place a CAMI Infant Dummy with the restraint system test harness in place in the high chair seat.

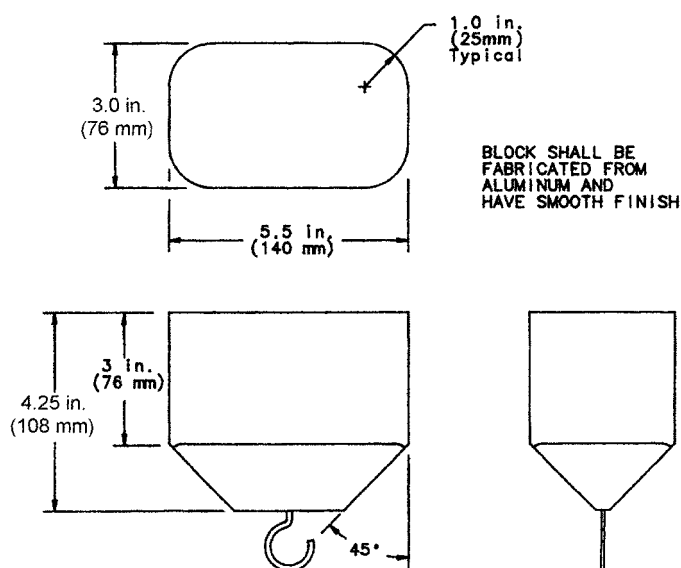
7.8.4 Secure the CAMI Infant Dummy into the high chair in accordance with the manufacturer's instructions.

7.8.4.1 For active restraint systems (intended to exclude passive restraint systems designed such that they do not require adjustment by a caregiver) adjust the waist restraint, using the webbing tension pull device shown in Fig. 7, so that a force of 2 lbf (9 N) applied to the waist restraint will provide a 1/4 in. (6 mm) space between the waist restraint and the CAMI Dummy.

7.8.5 Perform the following tests without readjusting the restraint system:

7.8.5.1 Apply a pull force of 45-lbf (200-N) horizontally on the approximate centerline of either leg of the dummy. Gradually apply the force within 5 s and maintain for an additional 10 s.

⁴ CAMI Infant Dummy Mark II (shown in Fig. 5) Department of Transportation, Federal Aviation Administration, April 29, 1974, and CAMI Infant Dummy, Drawing No. SA-1001, Memorandum Report AAC-119-74-14, Revision 11, by Richard F. Chandler, July 2, 1994.



NOTE 1—Not to scale.

FIG. 8 Wedge Block

7.8.5.2 Repeat 7.8.5.1 four additional times, for a total of five force applications, with a maximum interval of 2 s between tests.

7.8.5.3 Apply a pull force that is 45 lbf (200 N) greater than the weight of the dummy vertically upwards in line with the approximate centerline of the dummy's torso. Gradually apply the force within 5 s and maintain for an additional 10 s.

7.8.5.4 Repeat 7.8.5.3 four additional times, for a total of five force applications, with a maximum interval of 2 s between tests.

7.9 Permanency of Labels and Warnings (see 5.5):

7.9.1 A paper label (excluding labels attached by a seam) shall be considered permanent if, during an attempt to remove it without the aid of tools or solvents, it cannot be removed, it tears into pieces upon removal, or such action damages the surface to which it is attached.

NOTE 7—Paper labels are exempt from the small parts requirements of 16 CFR 1501 because paper cannot be meaningfully tested.

7.9.2 A non-paper label (excluding labels attached by a seam) shall be considered permanent if, during an attempt to remove it without the aid of tools or solvents, it cannot be removed or such action damages the surface to which it is attached.

7.9.3 A warning label attached by a seam shall be considered permanent if it does not detach when subjected to a 15 lb pull force applied in any direction most likely to cause failure using a 3/4 in. diameter clamp surface. Apply the force evenly over 5 s and maintain for an additional 10 s.

7.9.4 Adhesion Test for Warnings Applied Directly onto the Surface of the Product:

7.9.4.1 Apply the tape test defined in Test Method B – Cross-Cut Tape Test of Test Methods D3359 eliminating parallel cuts.

7.9.4.2 Perform this test once in each different location where warnings are applied.

7.9.4.3 The warning statements will be considered permanent if the printing in the area tested is still legible and attached after being subjected to this test.

7.9.5 A non-paper label, during an attempt to remove it without the aid of tools or solvents, shall not be removed or shall not fit entirely within the small parts cylinder defined in 16 CFR 1501 if it can be removed.

7.10 *Dynamic High Chair Test:*

7.10.1 Set up high chair in accordance with manufacturer's instructions.

7.10.2 Position a 6 by 6-in. (150 by 150-mm) wood block in the center of the seat.

7.10.3 Perform a drop test using a 50-lb. (23-kg) bag drop weight of 6 to 8-in. (150 to 200-mm) diameter using steel shot as the mass in the bag. The bag will be dropped onto the wood block in the seat from a height of 3 in. (75 mm) above the wood block. The drop is to be repeated 500 cycles. The cycle time is to be 4 s/cycle, ± 1 s. The drop height is to be adjusted to maintain the 3-in. (75-mm) drop height as is practical.

7.11 *Leg Openings:*

7.11.1 Secure the chair in its normal standing position so that it cannot move in the direction of the force being applied. Attach the tray in the position that creates the largest leg openings.

7.11.2 Into each leg opening, insert the tapered end of the wedge block, shown in Fig. 8, in the most adverse orientation. Apply a 25-lbf (111-N) force perpendicular to the base of the wedge block. The force shall be applied gradually within 5 s and maintained for an additional 10 s.

7.11.3 Repeat this procedure with the tray removed if a completely bounded opening exists after the tray is removed.

7.12 *Tray Latch Release Mechanism – Accessibility:*

7.12.1 Evaluate each tray latch release mechanism with leg/foot probes A and B, in Fig. 2, the tray adjusted into the position most likely to fail, and without the seat pad if use without the seat pad is a manufacturer's recommended use position.

7.12.2 At a height of 2 in. above the non-compressed seat pad or bottom surface, position the non-foot end of the probe in any location within seating surface and attempt to make contact with the tray latch release mechanism with the foot end of the probe. If the bottom surface of the foot can contact a latch release surface on the tray latch release mechanism, verify that the angle between Plane "A" and Plane "B" is 30° or greater using 30° Angle Block (Fig. 3).

7.13 With the tray attached in the manufacturer's recommended use position, gradually apply a 15-lb force over 5 s to the release mechanism in the direction most likely to fail and maintain for 10 s.

7.13.1 Test each release mechanism in each tray adjustment position.

7.14 *Side Containment Openings:*

7.14.1 For high chairs with multiple use modes recommended by the manufacturer in the instructional literature or marketing materials, all use modes as a high chair shall be evaluated according to this section.

7.14.2 Set up high chair in accordance with the manufacturer's instructions. If the high chair has adjustment(s) that alter the size or shape of a side opening, adjust the high chair to the adjustment position in which the side opening is most likely to fail.

7.14.3 Secure the high chair so it cannot move in the direction of the force being applied.

7.14.4 Test each side opening by inserting the tapered end of the wedge block, shown in Fig. 8, in the most adverse orientation. Apply a 25-lbf (111-N) force perpendicular to the base of the wedge block. The force shall be applied gradually within 5 s and maintained for an additional 10 s.

7.14.5 For high chairs with a tray, repeat this procedure with the tray removed if a completely bounded opening exists after the tray is removed and removal of the tray changes the size or shape of the side opening.

8. Labeling and Warnings

8.1 Each high chair shall have a permanent label or marking that identifies the name and address (city, state, and zip code) of either the manufacturer, distributor, or seller.

8.2 A permanent code mark or other product identification shall be provided on the high chair and its package or shipping container, if multiple packaging is used. The code will identify the date (month and year) of manufacture and permit future identification of any given model.

8.3 Any upholstery label required by law shall not be used to meet the requirements of 8.1 or 8.2.

8.4 Each high chair shall be labeled with warning statements. The warning statements shall be in contrasting color(s), permanent and conspicuous, and in sans serif style type.

8.4.1 In warning statements, the Safety Alert Symbol "△" and the signal word "**WARNING**" shall not be less than 0.2 in. (5 mm) high and the remainder of the text shall be in characters whose uppercase shall not be less than 0.1 in. (2.5 mm) high except as specified.

8.4.2 The following warning statement shall be included exactly as stated below:

"△**WARNING:** Prevent serious injury or death from falls or sliding out."

8.4.3 Additional warning statements shall address the following:

8.4.3.1 Always secure child in the restraint.

8.4.3.2 Never leave child unattended.

9. Instructional Literature

9.1 Instructions must be provided with the high chair and shall be easy to read and understand. Assembly, maintenance cleaning, operating, folding instructions, and warnings, where applicable, must be included.

9.2 The instructions shall contain the warnings as specified in 8.4.1 – 8.4.3. Additional warnings similar to the statements included in this section shall also be included.

9.2.1 A statement similar to the following, with each manufacturer substituting specific wording to describe their own restraining system:

△WARNING: The child should be secured in the high chair at all times by the restraining system. The tray is not designed to hold the child in the chair. It is recommended that the high chair be used only by children capable of sitting upright unassisted.

9.2.2 If the high chair has a reclining feature, a statement similar to the following shall be substituted for the warning in 9.2.1, with each manufacturer substituting specific wording to describe their own restraining system:

△WARNING: The child should be secured in the high chair at all times by the restraining system, either in the reclining or upright position. The tray is not designed to hold the child in the chair. It is recommended that the high chair be used in the upright position only by children capable of sitting upright unassisted.

10. Keywords

10.1 booster chair; feeding chair; high chair; youth chair

APPENDIX

X1. RATIONALE

X1.1 *Subsection 3.1.2*—Include definition for one type of latch design and the actuations that constitute double action.

X1.2 *Subsection 3.1.4*—New definition to define “front torso support.”

X1.3 *Subsection 3.1.5*—To define surfaces to be evaluated for potential tray release based on the ability of the occupant to apply force with a foot that should result in release of the tray latch and allow for angled surfaces that cannot be activated by the foot of an occupant.

X1.4 *Subsection 3.1.11*—To define the space to be considered as the seating surface.

X1.5 *Subsection 3.1.13*—Define term for use in the standard.

X1.6 *Subsection 5.7*—Incorporate ASTM safety requirements into the requirements for high chair safety for toy accessories included with a high chair.

X1.7 *Subsection 6.2*—Revise the requirement to broaden the standard to allow for newer high chair designs that have a component other than a tray (front torso support) such as a feeding tray or arm bar that provides the primary frontal support for the torso of the occupant and high chairs that provide a secondary feeding or snack tray that snaps into the main high chair tray. Move information limiting application of the requirement to trays that can be removed without the use of tools to this from 7.3.

X1.8 *Subsection 6.3*—Revise the requirement to broaden the standard to allow for newer high chair designs that have a component, other than a tray, such as a feeding tray or arm bar that provides the primary frontal support for the torso of the occupant and high chairs that provide a secondary feeding or snack tray that snaps into the main high chair tray.

X1.9 *Subsection 6.8.5*—Clarify that the attachment points for securing both the waist and crotch restraint system to the high chair must be attached to the high chair before shipment so that no assembly is required on the part of the consumer for initial use of the high chair. Requiring assembly of restraint system attachment points, by the manufacturer before shipment

of the product, provides the end user with a visible example of the correct assembly method for the attachment points as reference for reassembly after removal of the restraint system for activities such as cleaning or replacement.

X1.10 *Subsection 6.9.1.1*—Revise to include the option for the front torso support.

X1.11 *Subsection 6.11*—Include various requirements for tray latches that are not design restrictive and allow for various latch designs that can be used to secure a tray to a high chair. Also exclude high chairs that have a passive crotch restraint independent of the tray and provide passive restraint when the tray is removed.

X1.12 *Subsection 6.11.1*—Incident reports indicate that falls occur when the passive restraint is an integral part of the tray. When the occupant removes the tray there is no longer a passive restraint to help prevent the child from falling out of the high chair. High chairs that have a completely bounded opening in front of the occupant with the tray removed do not expose the occupant to a potential fall from sliding out of the high chair. Thus these designs are exempt from the tray latching requirements.

X1.13 *Subsection 6.11.2*:

X1.13.1 Provide for tray latch designs that are on the bottom surface of the tray, in front of the occupant, and that are either inaccessible or cannot be actuated by the occupant of the high chair.

X1.13.2 Add an exemption for tray latch release mechanisms that do not allow removal of the tray from either side. A tray may have an adjustment mechanism on one or both sides and it is intended that the tray shall not release from any attachment point. There was a high chair that was in the market several years ago that had a sliding adjustment on one side of the tray and an adjustment mechanism on the opposite side of the tray, so it is appropriate to include “shall not release from any attachment point” of the tray. Revised wording to be consistent with wording in 6.11.1.

X1.14 *Subsection 6.11.2.1 (No. 2)*—The movement of 30° is based on “The Analysis of Ankle Kinematics and Foot Contact Patterns Following the Onset of Walking in Normal

Children.” Data in report states 23 to 25°. Also, data in “The Handbook of Measurements and Capabilities of the Older Adult” states a mean of 20 for 55 to 60-year-old males and 20.7 for the same-aged females. Using this data and adding in approximately 10° for the movement of the toe.

X1.15 *Subsection 6.11.3*—Provide for tray latch designs that are either activated by application of a single force or multiple actions.

X1.16 *Subsection 6.12*—Apply current limit for bounded openings in front of the occupant (6.9.1.3) to openings in the side surfaces of the seating area. Add this requirement to address a potential entrapment hazard when the restraint system is not in use and the child is left unattended.

X1.17 *Subsection 7.3*—Revise to include front torso supports that are removable without tools. Move information about excluding trays that require tools to remove to 6.2.

X1.18 *Note 6*—Revise to include front torso support. Revise reference to 7.3 to 6.2 as this is a more appropriate way to reference the intended requirement.

X1.19 *Subsection 7.4*—Revise section title to add “front torso support” and clarify test purpose.

X1.20 *Subsection 7.4.1*—Modify to require the test is applied to the component that is providing the primary support for the front of the occupant’s torso and exclude other components from this requirement.

X1.21 *Subsection 7.4.2.1*—Limit testing of the tray to those that provide the primary support for the front of the child’s torso.

X1.22 *Subsection 7.4.2.2*—Revise wording to apply horizontal pull test to only the component that provides the primary support surface to restrain the front of the occupant’s torso and exempt other components that are placed in front of the occupant and are not designed to restrain forward movement of the child’s torso from this test. Front torso supports should be tested without any tray or tray insert in place that could provide support.

X1.23 *Subsection 7.4.3.1*—Revise wording to apply horizontal pull test to either the trays that functions as a front torso support and to front torso supports.

X1.24 *Subsection 7.5*—Revise wording to apply vertical pull test to either the tray or front torso support that provides the primary support to restrain the front of the occupant’s torso.

X1.25 *Subsection 7.5.1.1*—Revise wording to apply vertical pull test to either the tray or front torso support that provides the primary support surface to restrain the front of the occupant’s torso.

X1.26 *Subsection 7.5.2.1*—Revise wording to apply vertical pull test to either the tray or front torso support that provides the primary support to restrain the front of the occupant’s torso. Add requirements if two or more attachment points are used to secure the tray or front torso support.

X1.27 *Subsection 7.14*—New section for test methods for side openings.

X1.28 *Subsection 7.14.1*—Recognize that there are high chair designs with an upright seating position and a reclined infant position. Some designs provide for a high chair use and a lower height child’s chair use mode. Specify that the side opening requirement applies to all high chair use modes and exclude lower height use mode such as a child’s chair.

X1.29 *Subsection 7.14.2*—Define set-up and adjustment for testing. Recognize that some adjustments may affect the opening size or shape and the compliance with this section. Require adjustment into the position most likely to fail.

X1.30 *Subsection 7.14.3*—Secure the high chair to withstand application of the force during the test.

X1.31 *Subsection 7.14.4*—Adopt test method from the leg opening in front of the occupant, 7.11.2, but modify wording for the force application from “perpendicular to the plane of the opening” to state “perpendicular to the base of the wedge block” based on test experience and make like Consumer Safety Performance Specification F833.

X1.32 *Subsection 7.14.5*—Address the potential for use of the high chair without the tray and address designs where the tray may affect the size or shape of the opening.

X1.33 *Subsection 9.2*—Include this editorial change to eliminate repeating of warning statements in multiple sections thus avoiding potential for errors or variations between statements specified.

X1.34 *Rationale for Dimensions and Force Applied*—Per the 1975 SAE Anthropometry of U.S. Infants and Children, the 5th percentile 5 to 6 month old’s buttocks depth is 3.0 in. (actually reported as 2.99 in.). Per the 1977 University of Michigan Anthropometry of Infants, Children, and Youths, the 5th percentile 6 to 8 month old’s hip breadth is 5.5 in.

X1.35 *Other non-critical dimensions taken from the Toddler Wedge Block (Fig. 8)*—Per the 1975 SAE Anthropometry of U.S. Infants and Children, the 95th percentile 4 to 6 month old weighs 18.7 lb. The 95th percentile 31 to 36 month old weighs 36.6 lb. It didn’t seem appropriate to use the smallest, 18.7 lbf (because children older than 4 to 6 months are involved in accidents), or the largest, 36.6 lbf (because openings are sized for only a 6 month old, and 36.6 lb represents a 36 month old). I chose 25 lb, which represents a 95th percentile 10 to 12 month old’s weight (23.6 lb) rounded up.



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