



Designation: F404 – 10

# Standard Consumer Safety Specification for High Chairs<sup>1</sup>

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 ( $\epsilon$ ) 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.

<sup>1</sup> 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.

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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.*

## 2. Referenced Documents

2.1 ASTM Standards:<sup>2</sup>

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

<sup>2</sup> 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.

**F963 Consumer Safety Specification for Toy Safety**
**2.2 Federal Regulations:**<sup>3</sup>

**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

cannot be removed or such action damages the surface to which it is attached; (2) a paper label shall be considered permanent if, during an attempt to remove it without the aid of tools or solvents, it cannot be removed, it tears upon removal or such action damages the surface to which it is attached.

3.1.9.2 *labels attached by a seam*—label attached by a seam shall be considered permanent if it complies with the requirements of 7.9 and does not tear, yielding a separate part, during the test.

3.1.9.3 *warning statements*—warning statements applied directly onto the surface of the product by hot stamping, heat transfer, printing or wood burning, etc., will be considered permanent if the printing in the area tested is still legible and attached after being subjected to the test prescribed in 7.10. If warning statements are on labels, refer to 3.1.9.1 or 3.1.9.2.

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 ± 9°F (23 ± 5°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.

### 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 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 *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.

3.1.5 *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.

3.1.6 *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.

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

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

3.1.9 *permanent (label/warning attachment), n:*

3.1.9.1 *labels not attached by a seam*—(1) a nonpaper label or decal shall be considered permanent if, during an attempt to manually remove it without the aid of tools or solvents, it

<sup>3</sup> Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

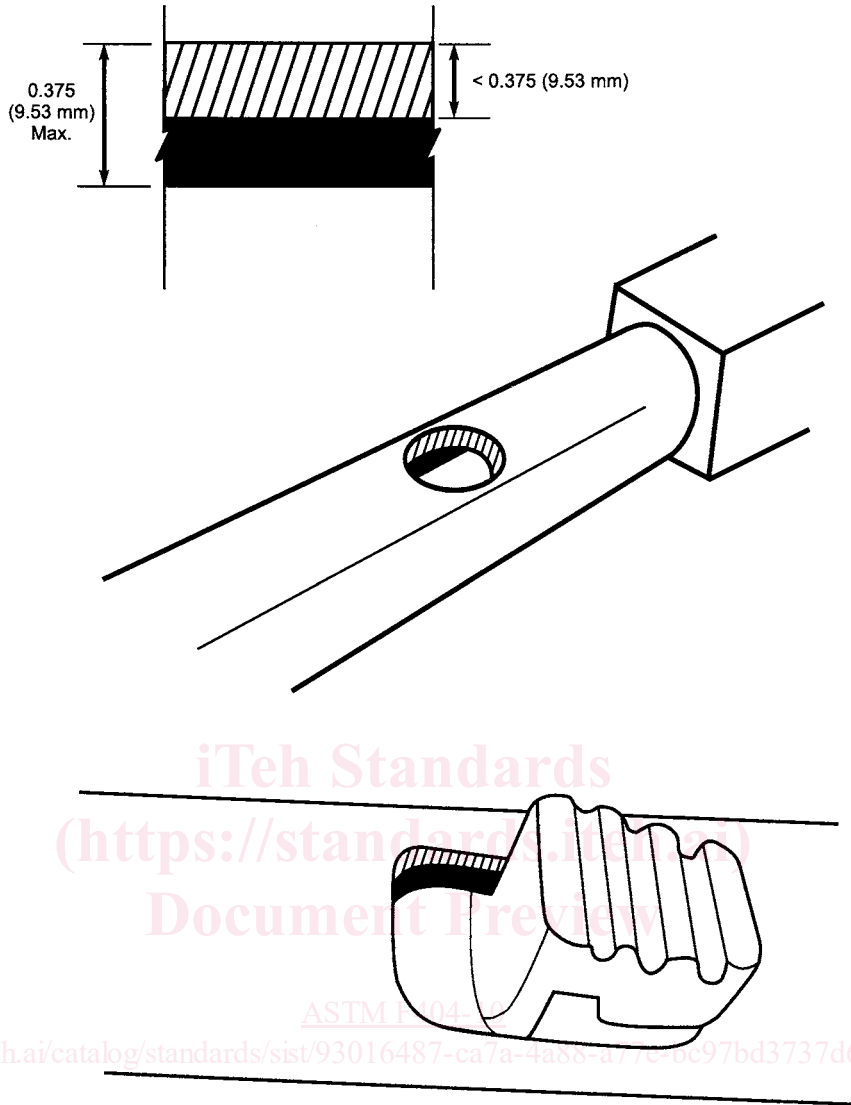


FIG. 1 Opening Example

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 *Nonpaper Labels:*

5.5.1 Nonpaper labels or decals (such as warning labels, brand name labels, decorative labels, or pin-striping) that may present a choking hazard if removed must be permanent.

NOTE 2—Paper labels are exempt from the small parts requirements of 16 CFR 1501 because paper cannot be meaningfully tested.

5.5.1.1 Nonpaper labels that may present a choking hazard are those which upon removal fit entirely within the small parts

cylinder as defined in 16 CFR 1501. Nonpaper labels that tear when tested in accordance with 3.1.9.1 (I) are considered labels which may pose a choking hazard.

5.5.1.2 Nonpaper labels attached by a seam, except warning labels, that tear along a seam only and do not yield a part which fits entirely within the small parts cylinder, defined in 16 CFR 1501, are not considered labels that pose a choking hazard and thus are not required to be permanent.

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 *Tray Performance (Drop)*—The tray 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.

6.3 *Tray Performance (Pull)*—The tray shall not become disengaged or dislocated from its original adjustment position, when tested in accordance with 7.4 and 7.5.

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.

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 must be attached to the high chair 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 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.

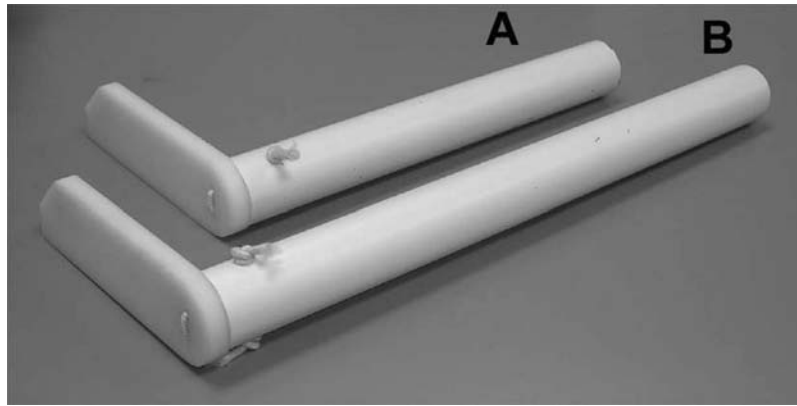
6.9.1.3 The leg openings on each side of the passive crotch restraint shall not allow complete passage of the wedge block when tested in accordance with 7.12.

### 6.10 Structural Integrity:

6.10.1 During and upon completion of the testing in accordance with 7.11, 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.



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

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.

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 7.13.1.

(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 7.13.2 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 7.14. 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 7.15.

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:*

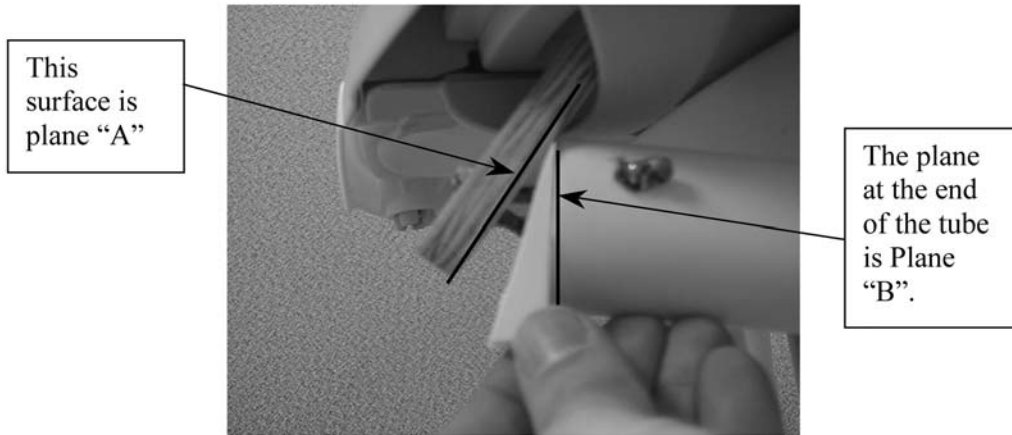


FIG. 3 30° Angle Block

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.

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.

15 lb Max TENSION

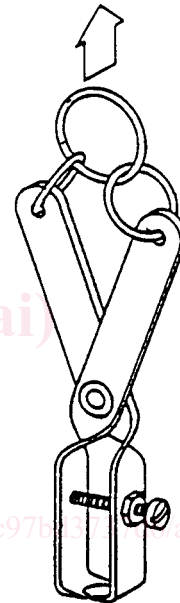


FIG. 4 Tension Test Adapter/Clamp

7.3 *Tray—Drop Test*—From a height of 36 in. (900 mm) measured from the center point of the tray, drop the tray on vinyl tile over concrete flooring once on each of four different surfaces, one surface of which shall include the attaching mechanism. Do not conduct this test on trays that require a screwdriver or wrench to remove tray from high chair.

NOTE 6—For the purposes of this test only, the center point of the tray coincides with the center of the smallest rectangle that circumscribes the tray in the plane of the tray.

7.4 *Tray—Horizontal Force:*

7.4.1 Perform this test on all trays. If the tray is of a type required to be tested in accordance with 7.3, perform this test on a tray 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. Attach the tray