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Standard Consumer Safety Specification for Infant Swings¹

This standard is issued under the fixed designation F2088; 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 infant swing incidents identified by the U.S. Consumer Product Safety Commission (CPSC).

In response to incident data compiled by the CPSC, this consumer safety specification attempts to minimize the following: (1) swings tipping over or collapsing, (2) structural failures, and (3) entanglement in the restraints or entrapment in leg holes. This consumer safety specification is intended to cover normal use and reasonably foreseeable misuse or abuse of infant swings. This specification does not cover swings that are blatantly misused or used in a careless manner that disregards the safety instructions and warnings provided with each infant swing.

This consumer safety specification is written within the current state-of-the-art of infant swing technology and 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 establishes safety performance requirements, test methods, and labeling requirements to minimize the hazards to infants presented by swings as identified in the introduction.

1.2 This consumer safety specification is intended to minimize the risk of injuries to infants resulting from normal use and reasonably foreseeable misuse or abuse of infant swings. It is not intended to address all incidents and injuries resulting from the interaction of other persons with the infant in the swing.

1.3 No swing 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.

1.4 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 precautionary caveat pertains only to the test method portion, Section 7, of this consumer safety 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*:²

D3359 Test Methods for Measuring Adhesion by Tape Test
F963 Consumer Safety Specification for Toy Safety

2.2 *Federal Standards*:³

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

16 CFR Part 1500 Hazardous Substances Act Regulations including sections:

1500.48—Technical Requirements for Determining a Sharp Point in Toys or 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-.51—Test Method for Simulating Use and Abuse of Toys and Other Articles Intended for Use by Children

16 CFR Part 1501 Method for Identifying Toys and Other Articles Intended for Use by Children Under Three Years

¹ This consumer safety specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.21 on Infant Carriers, Bouncers and Baby Swings.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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



FIG. 1 CAMI Infant Dummy, Mark II

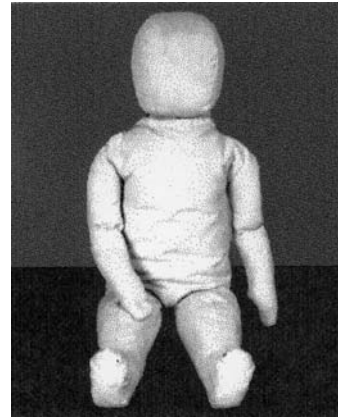


FIG. 2 CAMI Newborn Dummy

of Age Which Present Choking, Aspiration, or Ingestion Hazards Because of Small Parts

29 CFR 1910.7 Definition and requirements for a nationally recognized testing laboratory

2.3 Other Documents:

CAMI Infant Dummy, Mark II (see Fig. 1)⁴

CAMI Newborn Dummy (see Fig. 2)⁵

UL 1310 Standard for Class 2 Power Units⁶

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 that the manufacturer shows in a like manner in its literature to be unacceptable, unsafe, or not recommended.

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

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

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

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

3.1.10 *structural component, n*—any load bearing member or part of the product that supports the weight or portion of the weight of the occupant.

3.1.11 *travel swing, n*—a low profile, compact swing having a distance of 6 in. or less between the underside of the seat bottom and the support surface (floor) at any point in the seat's range of motion.

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 floor covering, unless test instructs differently.

4.2 The product 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 hour prior to testing. Testing then shall be conducted within this temperature range.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *conspicuous, n*—a label which 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 infant swing but not necessarily visible from all positions.

3.1.2 *cradle swing, n*—an infant swing which is intended for use by a child lying flat.

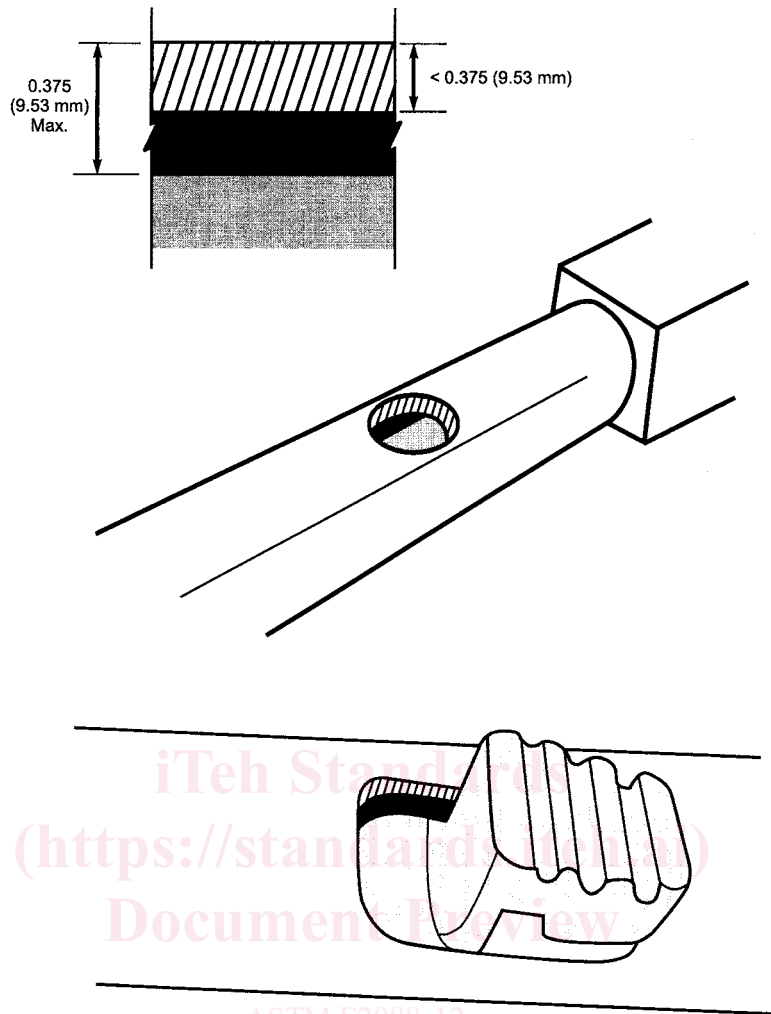
3.1.3 *dynamic load, n*—application of impulsive force through free fall of a weight.

3.1.4 *infant swing, n*—a stationary unit with a frame and powered mechanism that enables an infant to swing in a seated position. An infant swing is intended for use with infants from birth until a child is able to sit up unassisted.

⁴ Department of Transportation Memorandum Report AAC-119-74-14, Revision II, Drawing No. SA-1001 by Richard Chandler, July 2, 1974. Federal Aviation Administration, Civil Aeromedical Institute, Protection and Survival Laboratory, Aeromedical Center, Oklahoma City, OK 73125.

⁵ Drawing numbers 126-0000 through 126-0015 (sheets 1 through 3), 126-0017 through 126-0027, a parts list entitled "Parts List for CAMI Newborn Dummy", and a construction manual entitled, "Construction of the Newborn Infant Dummy" (July 1992). Copies of the materials may be inspected at NHTSA's Docket Section, 400 Seventh Street, SW., Room 5109, Washington, DC, or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

⁶ Available from Underwriters Laboratories (UL), 2600 N.W. Lake Rd., Camas, WA 98607-8542, <http://www.ul.com>.



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FIG. 3 Opening Examples

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

5. General Requirements

5.1 *Hazardous Sharp Edges or Points*—There shall be no hazardous sharp points or edges as defined by 16 CFR 1500.48 and 16 CFR 1500.49 before and after testing to the consumer safety specification.

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

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

5.4 *Wood Parts*—Prior to testing, any exposed wood parts shall be smooth and free from splinters.

5.5 *Scissoring, Shearing, Pinching*—A product, 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 may cause injury could exist when the edges of any rigid parts admit a probe greater than 0.210 in. (5.33 mm) and less than 0.375 in. (9.53 mm) diameter at any accessible point throughout the range of motion of such parts.

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. 3). The product shall be evaluated in all manufacturer’s recommended use positions.

5.7 *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 (5.33 mm) or greater during static load testing (see 7.3.2) shall be covered or otherwise designed to prevent injury from entrapment.

5.8 *Protective Components*—If a 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 7.2.

5.9 *Labeling:*

5.9.1 Warning labels, (whether paper or non paper) shall be permanent when tested per 7.8.

5.9.2 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.

5.9.3 Non-paper labels shall not liberate small parts when tested in accordance with 7.10.

5.10 *Toys*—Toy accessories attached to, removable from, or sold with an infant swing, as well as their means of attachment, must meet applicable requirements of Consumer Safety Specification F963.

5.10.1 Toy mobiles that attach solely to an infant swing are not required to contain labeling as stated in Consumer Safety Specification F963, Section 5, Safety Labeling for Mobiles, and Section 6, Instructional Literature for Mobiles.

5.10.2 Toy mobiles included with the swing that have toys within the reach of the occupant shall not detach rigid components when tested in accordance with 7.12. Detachment of a soft toy only is not considered a failure.

NOTE 1—The intent is to exempt soft items that would not result in impact injury if the occupant was struck by that component. Examples are soft filled toys, stuffed toys, and pliable toys.

6. Performance Requirements

6.1 *Electrically Powered Swings (remote control devices are exempt from the requirements in 6.1):*

6.1.1 Each battery compartment or area immediately adjacent to the battery compartment shall be marked permanently and legibly to show the correct battery polarity, size, and voltage.

6.1.2 Each battery compartment shall provide a means to contain the electrolytic material in the event of a battery leakage. This containment means shall not be accessible to the occupant.

6.1.3 Positive protection from the possibility of charging any primary (non-rechargeable) battery shall be achieved either through physical design of the battery compartment or through the use of appropriate electrical circuit design. This applies to situations in which a battery may be installed incorrectly (reversed), and in which a battery charger may be applied to a product containing primary batteries. This section does not apply to a circuit having one or two batteries as the only source of power.

6.1.4 The surfaces of any accessible electrical component, including batteries, shall not achieve temperatures exceeding 160°F (71°C) when tested in accordance with 7.1. At the conclusion of the test, there shall be no battery leakage or, explosion or a fire to any electrical component. This test shall be performed prior to conducting any other testing within the performance requirements section.

6.1.5 AC adapters supplied with the product must denote compliance with the appropriate current national safety standard for AC adapters from a Nationally Recognized Testing Laboratory (NRTL). AC adaptors must have a nominal output voltage less than 30 VDC (42.4 VAC (peak)) and must not be capable of delivering more than 8 amps into a variable resistive load for one minute.

NOTE 2—Refer to UL 1310 for Class II output definitions and evaluation.

NOTE 3—NRTLs are organizations recognized by OSHA in accordance with 29 CFR 1910.7 to test and certify equipment or materials (products) requiring approval by certain OSHA safety standards. A current list of NRTLs can be found at <http://www.osha.gov/dts/otpc/nrtl/nrtllist.html>.

6.2 *Structural Integrity*—All tests that cover static and dynamic loading are to be performed sequentially on the same product and in the sequence listed in the standard without refurbishing or repositioning of adjustment, if any.

6.2.1 *Dynamic Load*—The swing shall support a dynamic load and there shall be no failure of seams, breakage of materials, or changes of adjustments that could cause the product to not fully support the child or create a hazardous condition as defined in Section 5 after testing in accordance with 7.3.1.

6.2.2 *Static Load*—The swing shall support a static load and there shall be no failure of seams, breakage of materials, or changes of adjustments that could cause the product to not fully support the child or create a hazardous condition as defined in Section 5 after testing in accordance with 7.3.2.

6.3 *Stability Test*—The swing shall not tip over when tested according to 7.4.

6.4 *Unintentional Folding*—The swing shall remain in the manufacturer's recommended use position when tested per 7.5. If a unit is designed with a latching or locking device, that device shall remain engaged and operative after testing.

6.4.1 Threaded fasteners used to attach structural components shall have a locking mechanism such as lock washers, self-locking nuts or other means to prevent detachment due to vibration.

6.5 *Restraint System*—A restraint system shall be provided to secure a child in the seated positions in any of the manufacturer's recommended use positions.

6.5.1 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.

6.5.2 Swings with a maximum seat back angle greater than 50° from horizontal measured in accordance with 7.13 shall include shoulder straps as part of the restraint system.

6.5.3 This system and its closing means shall not slip more than 1 in. (25 mm), break, separate, or permit the removal of the test dummy when tested per 7.6.

6.5.4 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.

6.5.5 Before shipment, the restraint system must be attached to the swing in such a manner as to not become detached through normal use.

6.5.6 If the swing seat has a tray or other component that creates a completely bounded opening in front of the occupant, a passive crotch restraint system shall be included and designed such that its use is mandatory when the tray or other component is in use.

6.6 *Passive Crotch Restraint System*—For products with a tray or other component that creates a completely bounded opening in front of the occupant.

6.6.1 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.

6.6.2 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.

6.7 *Cradle Swing Orientation*—The angle of the cradle swing surface along the dummy’s head-to-toe axis relative to the horizontal shall not be greater than 5° when tested in accordance to 7.7.

6.8 *Seat Angles for Swings with Removable Tray/Armbar or Without Tray/Armbar:*

6.8.1 Products with a horizontal axis of swing motion shall meet the requirements described in 6.8.1.1 or 6.8.1.2.

6.8.1.1 The angle between the seat back and horizontal shall be:

- less than 60° for full size swings
- less than 45° for travel swings

and the angle between the seat bottom and horizontal shall be 30° or greater when tested in accordance with 7.14.

6.8.1.2 The product shall include shoulder straps as part of the restraint system.

6.8.2 Products with other than horizontal axis of swing motion shall meet the requirements described in 6.8.2.1 or 6.8.2.2.

6.8.2.1 The angle between the seat bottom and horizontal shall be 5° or greater when tested in accordance with 7.15.

6.8.2.2 The product shall include shoulder straps as part of the restraint system.

7. Test Methods

7.1 The swing shall be tested using fresh alkaline batteries or an a/c power source. If the swing can be operated using both, then both batteries and a/c power must be tested separately. If another battery chemistry is specifically recommended for use in the swing by the manufacturer, repeat the test using the batteries specified by the manufacturer. If the swing will not operate using alkaline batteries, then test with the type of battery recommended by the manufacturer at the specified voltage. The test is to be carried out in a draft-free location, at an ambient temperature of 68 ± 9°F (20 ± 5°C).

7.1.1 Secure the swing so that the seat cannot move during the test. Operate the swing at the maximum speed. Do not disable any mechanical or electrical protective device, such as clutches or fuses. Operate the swing continuously, and record peak temperature. The test shall be discontinued 60 min after the peak temperature is recorded. If the swing shuts off automatically or must be kept “on” by hand or foot, monitor

15 lbf (67 N)
Maximum Tension

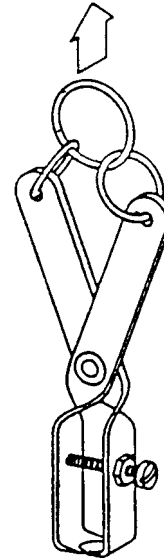


FIG. 4 Tension Test Adapter/Clamp

temperatures for 30 s, resetting the swing as many times as necessary to complete the 30 s of operation. If the swing shuts off automatically after an operating time of greater than 30 s, continue the test until the swing shuts off.

7.2 Removal of Protective Components Test:

7.2.1 Any protective component shall be tested in accordance with each of the following methods in the sequence listed.

7.2.2 Securely locate the swing so that it cannot move during the performance of the following tests:

7.2.3 *Torque Test*—A torque shall be applied to any graspable component (see 5.8) within a period of 5 s in a clockwise direction until either the component rotates 180° from the original position or the torque attains 2 lbf-in. (0.2 Nm). The torque or maximum rotation shall be maintained for an additional 10 s. The torque shall then be removed and the test components permitted to return to a relaxed condition. This procedure shall then be repeated in the counter-clockwise direction.

7.2.4 Tension Test:

7.2.4.1 Attach a force gage to the component cap, sleeve, or plug by means of any suitable device. For protective components that cannot be reasonably expected to be grasped between thumb and forefinger, or teeth on their outer diameter but have a gap of 0.040 in. (1.0 mm) or more behind the rear surface of the component and the structural member of the swing to which they are attached, a clamp such as the one shown in Fig. 4 may be a suitable device.

7.2.4.2 Be sure that the attachment device does not compress or expand the component hindering any possible removal.

7.2.4.3 Gradually apply a force of 15 lbf. (67 N) in the direction that would normally be associated with the removal of the protective component over a 5 s period and hold for an additional 10 s.

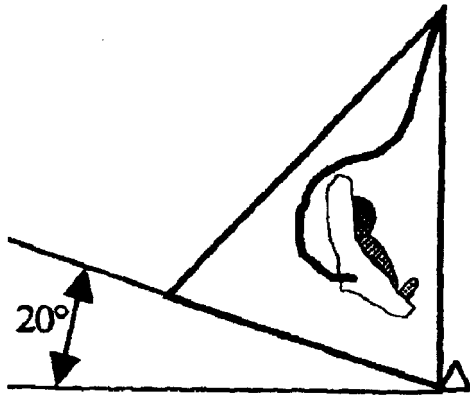


FIG. 5 Stability Test

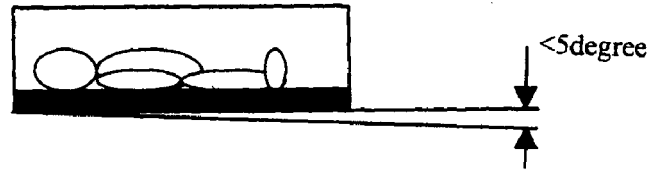


FIG. 6 Cradle Swing Angle Measurement

7.3 Structural Integrity:

7.3.1 Dynamic Load:

7.3.1.1 Test Equipment—Shot bag, 6 to 8 in. (15 to 20 cm) diameter bag filled with shot; total weight 25 lb (11.4 kg).

7.3.1.2 Set-up the swing in accordance with the manufacturer’s instructions. If the swing seat has more than one height position, recline position, facing direction, tray position, or other adjustable feature position, test the product in the configuration most likely to fail.

7.3.1.3 Place the shot bag on the seating surface of the swing and allow swinging motion to come to rest. Secure the swing so that the seat cannot move during the test. The means of securing the seat shall not affect the outcome of the test. Raise the shot bag a distance of 1 in. (25 mm) above the seat of the swing. Drop the weight onto the seat 500 times with a cycle time of 4 ± 1 s/cycle. The drop height is to be adjusted to maintain the 1 in. (25 mm) drop height as is practical.

7.3.2 Static Load Test:

7.3.2.1 Test Equipment—Wood block, 6 by 6 by $\frac{3}{4}$ in. (150 by 150 by 19 mm).

7.3.2.2 By any necessary means, place a static load of 75 lb (34.1 kg) or 3 times the manufacturer’s maximum recommended weight, whichever is greater, in the center of the seat distributed by a wood block. Gradually apply the weight within 5 s and maintain for 60 s.

7.4 Stability Test:

7.4.1 Test Equipment:

7.4.1.1 CAMI Mark II Dummy, 17.5 lb (8 kg) (see 2.3 and Fig. 1).

7.4.1.2 Inclined Surface—A smooth inclined surface with a 1 by 1 in. (25 by 25 mm) stop or equivalent device mounted parallel to the lower edge of the surface and parallel to the floor so as to prevent the swing from sliding, but not prevent it from tipping.

7.4.2 Stability in the Direction of Swing Motion:

7.4.2.1 Adjust the inclined surface to 20° from horizontal.

7.4.2.2 Place the CAMI Dummy Mark II in the swing seat.

7.4.2.3 For a product with a horizontal axis of swing motion, position the product on the inclined surface with the axis of swinging motion parallel to the stop and the lower most frame member(s) in contact with the stop as shown in Fig. 5. If the swing seat has more than one height position, recline

position, facing direction, direction of motion, tray position, or other adjustable feature position, test the product in the configuration most likely to fail. Rotate the swing frame 180° and repeat the procedure.

7.4.2.4 For a product with other than horizontal axis of swing motion, position the product on the inclined surface in the most onerous swing orientations such that the product is in contact with the stop. If the swing seat has more than one height position, recline position, facing direction, direction of motion, tray position, or other adjustable feature position, test the product in the configuration most likely to fail.

7.5 Unintentional Folding Test:

7.5.1 With the unit in the manufacturer’s recommended use position, apply a force of 10 lbf (45 N) at the end of a leg in the direction normally associated with folding, while holding opposite leg(s) stationary. Gradually apply the force over 5 s and maintain for an additional 10 s. Repeat this test on each leg.

7.6 Restraint System Test:

7.6.1 Secure the swing seat so that it cannot move.

7.6.2 Apply a force of 35 lbf (156 N) to a single attachment point of the restraint system in the normal use direction(s) in which stress would be applied to that attachment. Gradually apply the force within 5 s and maintain for an additional 10 s. Repeat a total of five times with a maximum interval of 2 s between tests. Repeat for each attachment point of the restraint system and each fastening device.

7.6.3 Place the CAMI Infant Dummy, Mark II in the swing seat with the restraining system engaged according to the manufacturer’s instructions. Tighten the restraint system in such a manner that you can comfortably slide your little finger between the strap and the test dummy. Perform the following test without readjusting the restraining system. Gradually apply a pull force of 35 lbf. (156 N) horizontally to either leg of the test dummy. Gradually apply the force within 5 s and maintain for an additional 10 s. Repeat this procedure a total of 5 times with a maximum of 2 s between test.

7.7 Cradle Swing Orientation Test:

7.7.1 Dynamic Angle—Place the CAMI Newborn Dummy (7.5 lb) into the cradle with its back on the support surface in the most disadvantageous position. The dummy’s head-to-toe centerline must remain parallel to the head-to-toe centerline of the support surface.

7.7.1.1 Start the swing in motion in accordance with the manufacturer’s instructions. Measure the angle of the bed surface along the CAMI’s head-to-toe axis relative to the horizontal. The angle shall be less than 5° as shown in Fig. 6.

7.7.2 Static Angle—Place the CAMI newborn dummy into the cradle swing with its back on the support surface in the