



Designation: F2549 – 22

# Standard Consumer Safety Specification for Frame Child Carriers<sup>1</sup>

This standard is issued under the fixed designation F2549; 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 incidents associated with frame child carriers identified by the U.S. Consumer Product Safety Commission (CPSC).

In response to incident data compiled by the CPSC, this specification attempts to minimize fall hazards associated with occupant retention and structural integrity of the product(s), as well as the deficiency of consumer education regarding product use.

This specification is intended to cover normal use and reasonably foreseeable misuse or abuse of the product(s).

This specification is written within the current state-of-the-art of frame child carrier 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 covers performance requirements, test methods, and marking requirements to promote safe use of frame child carriers.

1.2 This consumer safety specification is intended to minimize the risk of injury to a child from the normal use and reasonably foreseeable misuse of these products.

1.3 For the purposes of this consumer safety specification, a frame child carrier is a product, normally of sewn fabric construction on a tubular metal or other frame, which is designed to carry a child, in an upright position, on the back of the caregiver. A frame child carrier is intended for use with a child that is able to sit upright unassisted and weighs between 16 lb and 50 lb (7.3 kg and 22.7 kg). The frame child carrier is intended to be worn on the back of the caregiver's body, with the carrier, and thus the child, suspended from both shoulders of the caregiver. The seated position of the child is either facing towards or away from the caregiver.

1.4 No frame child carrier produced after the approval date of this consumer safety specification shall, either by label or other means, indicate compliance with the specification unless it complies with all of the requirements contained herein.

1.5 This consumer safety specification is not intended to address incidents and injuries resulting from the interaction of

other persons or objects with the caregiver and child while the frame child carrier is in use.

1.6 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.

1.7 The following precautionary caveat pertains only to the test method 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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

## 2. Referenced Documents

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

[F2236 Consumer Safety Specification for Soft Infant and Toddler Carriers](#)

[D3359 Test Methods for Rating Adhesion by Tape Test](#)

[F963 Consumer Safety Specification for Toy Safety](#)

<sup>1</sup> This 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

F2907 Consumer Safety Specification for Sling Carriers

2.2 EN Standard:<sup>3</sup>

EN 13209 Child Use and Care Articles (Child Carriers Safety Requirements and Test Methods)

2.3 Federal Regulations:<sup>4</sup>

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

16 CFR 1500 Hazardous Substance Act regulations including:

1500.3 (c) (6) (vi) Definition of “Flammable Solid”

1500.44 Method for Determining Extremely Flammable and Flammable Solids

1500.48 Technical Requirements for Determining a Sharp Point in Toys 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

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

16 CFR 1610 Standard for the Flammability of Clothing Textiles

2.4 Other Document:

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

2.5 ANSI Standards:<sup>5</sup>

ANSI Z535.1 Safety Colors

ANSI Z535.4 Product Safety Signs and Labels

ANSI Z535.6 Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials

3. Terminology

3.1 Definitions:

3.1.1 *attachment system, n*—a system provided to secure the product to the caregiver’s torso in any of the manufacturer’s recommended use positions.

3.1.2 *conspicuous, adj*—visible when the product is in the manufacturer’s use position to a caregiver who is placing the occupant in the frame child carrier or when the caregiver places the product on his or her body.

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

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

3.1.5 *handle, n*—a component intended to facilitate lifting of the frame child carrier.

3.1.6 *kickstand, n*—a hinged frame member designed to deploy and allow the child carrier to stand freely, in the upright position, for loading of child. The frame member can then be retracted when the carrier is in use.

3.1.7 *leg opening, n*—the opening in the frame child carrier through which the occupant’s legs extend when the product is used in any of the manufacturer’s recommended use positions.

3.1.8 *manufacturer’s recommended use position(s), n*— any position that is presented as a normal, allowable, or acceptable configuration for 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.

3.1.9 *occupant, n*—that individual who is restrained in a seated position inside the frame child carrier in one of the manufacturer’s recommended use positions.

3.1.10 *occupant retention system, n*—a system provided to secure the occupant in a seated position in any of the manufacturer’s recommended use positions.

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

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

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

3.1.14 *static load, n*—a vertically downward load applied by weights or other means.

4. Calibration and Standardization

4.1 The product shall be completely assembled in accordance with the manufacturer’s instructions.



FIG. 1 CAMI Dummy, Mark II

<sup>3</sup> Available from European Committee for Standardization (CEN), 36 rue de Stassart, B-1050, Brussels, Belgium, <http://www.cenorm.be>.

<sup>4</sup> Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

<sup>5</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

4.2 No testing shall be conducted within 48 h of manufacture.

4.3 The product to be tested shall be at an ambient temperature of  $73 \pm 9^\circ\text{F}$  ( $23 \pm 5^\circ\text{C}$ ) for at least 1 h before testing. All testing shall be conducted in this temperature range.

4.4 All testing required by this consumer safety specification shall be conducted on the same unit in the order presented in this specification.

## 5. General Requirements

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

5.2 *Small Parts*—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 *Lead in Paint*—The paint or surface coating on the product shall comply with 16 CFR 1303.

5.4 *Wood Parts*—Prior to testing, any wooden parts shall be smooth and free of splinters.

5.5 *Scissoring, Shearing, and Pinching*—The product, when in the manufacturer's recommended use position(s), shall be designed and constructed to prevent injury to the occupant from any scissoring, shearing, or pinching when members or components rotate about a common axis or fastening point, slide, pivot, fold, or otherwise move relative to one another. Scissoring, shearing, or pinching that may cause injury exists when the edges of the rigid parts admit a probe greater than 0.210 in. (5.33 mm) and less than 0.375 in. (9.53 mm) in 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. 2). The product shall be evaluated in all manufacturers' 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) shall be covered or otherwise designed to prevent injury.

5.8 *Locking and Latching*—Any frame child carrier that folds, for storage or transport, shall have a latching or locking device or other provision in the design that will prevent the unit from unintentionally folding when properly placed in the manufacturer's recommended use position. The unit shall remain in its manufacturer's recommended use position during and upon completion of the test in accordance with 7.8. If a unit is designed with a latching or locking device, that device shall remain engaged and operative after testing. This requirement does not apply to the carrier kickstand.

5.9 *Unintentional Folding*—If the frame child carrier is designed to allow it to stand freely in the upright position by utilizing a kickstand or other means, the carrier shall remain in the manufacturer's recommended use position before and after completion of all tests in 7.9.

5.10 *Labeling*—Warning labels (whether paper or non-paper) shall be permanent when tested in accordance with 7.7.

5.10.1 Warning statements applied directly onto the surface of the product by hot stamping, heat transfer, printing, wood burning, and so forth shall be permanent when tested in accordance with 7.7.

5.10.2 Non-paper labels shall not liberate small parts when tested in accordance with 7.7.

5.11 *Protective Components*—If the child can grasp protective components between the thumb and forefinger, or teeth, or if there is at least a 0.04 in. (1.0 mm) gap between the component and its adjacent parent component, such component shall not be removed when tested in accordance with 7.10. All protective components that are accessible to a child in the product shall be evaluated.

### 5.12 Flammability of Frame Child Carriers:

5.12.1 There shall be no Class 2 or 3 fabrics used in the construction of a frame child carrier when the fabrics are evaluated against the requirements of 16 CFR 1610.

NOTE 1—The exemptions listed in 16 CFR sections 1610.1(d) and 1610.6(a)(1)(vi) apply when a fabric is evaluated against the requirements of 16 CFR 1610.

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

5.12.3 Non-toy accessories that are sold with and intended to be attached to the product shall also meet the requirements of 5.12.

5.13 *Toys*—Toy accessories attached to, removable from, or sold with a child frame carrier, as well as their means of attachment, shall comply with the applicable requirements of Consumer Safety Specification F963.

## 6. Performance Requirements

6.1 *Leg Openings*—Leg openings shall not permit the passage of the Leg Opening Test Sphere when tested in accordance with 7.1.

6.2 *Dynamic Strength*—The carrier shall not create a hazardous condition, such as frame or fasteners breaking or disengaging or seams separating, and shall show no damage that will impair its function, when tested in accordance with 7.2. Seams of pockets, pouches, and other carrying receptacles are exempt from these requirements. Adjustable components in the occupant retention system and attachment system shall not slip more than 1 in. (25.4 mm) per strap as a result of the dynamic testing in accordance with 7.2.4 and 7.2.5.

6.3 *Static Load*—The carrier shall not create a hazardous condition, such as not supporting the test weight, frame or fasteners breaking or disengaging, or seams separating, when tested in accordance with 7.3. Adjustable elements in the

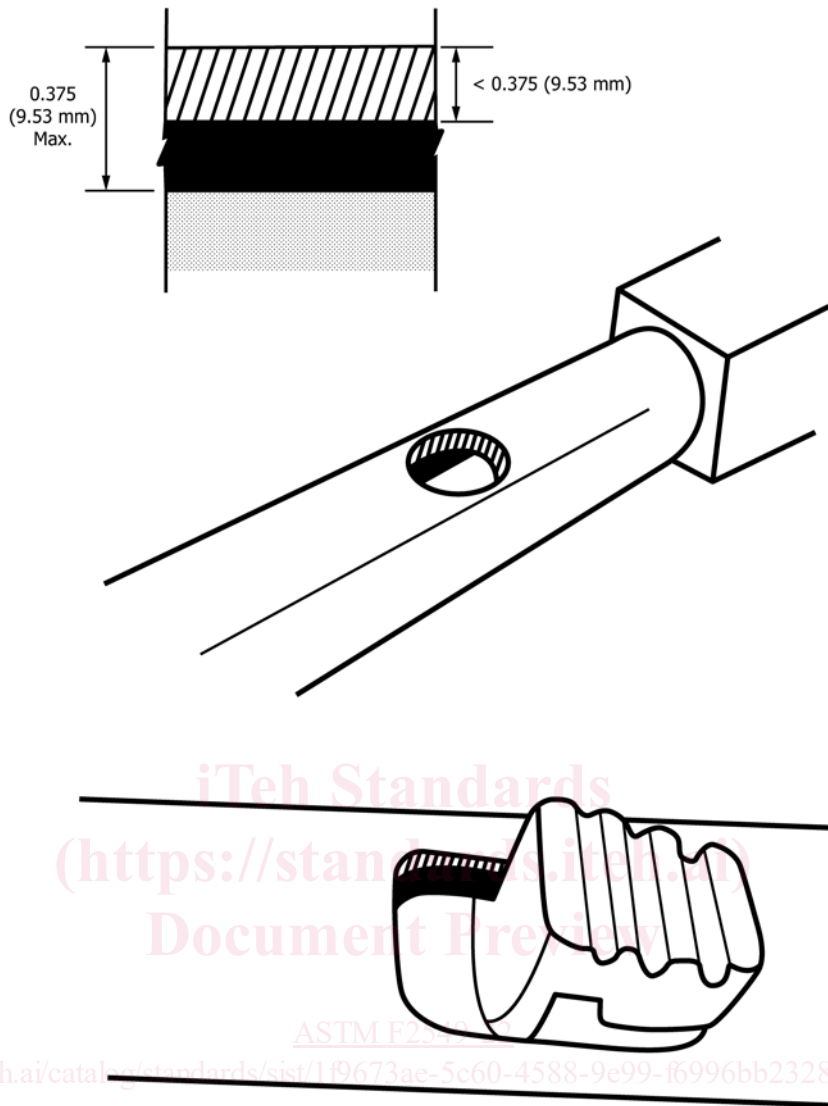


FIG. 2 Opening Example

occupant retention system shall not slip more than 1 in. (25.4 mm) when tested in accordance with 7.3.

6.4 *Stability*—If the frame child carrier is designed to allow it to stand freely in the upright position, the frame child carrier shall not tip over when tested in accordance with 7.4.

6.5 *Retention System:*

6.5.1 A retention system, including a shoulder restraint, shall be provided to secure the occupant in a seated position in any of the manufacturer’s recommended use positions.

6.5.2 Before shipment, the manufacturer shall attach the retention system in such a manner that it will not detach in normal usage.

6.5.3 If the retention system includes a crotch restraint designed to work with a lap belt, it shall be designed such that its use is mandatory when the retention system is in use.

6.5.4 When tested in accordance with 7.5, the restraint system and its closing means (for example, a buckle) shall not break, disengage, or separate at any seam and all fasteners shall not release or suffer damage that impairs the operation and

function of the restraint system. At the end of the tests, the CAMI dummy shall not be released fully or fall out of the carrier.

6.6 *Handle Integrity*—The carrier shall not create a hazardous condition such as handle or frame breaking or disengaging or seams separating when tested in accordance with 7.6.

7. Test Methods

7.1 *Leg Openings:*

7.1.1 Place the CAMI Infant Dummy into the frame carrier in accordance with the manufacturer’s instructions, fasten all restraint harnesses and if applicable, tighten any other adjustment straps used for securing or containing, or both, the occupant in the carrier. Adjust the seat height in accordance with the manufacturer’s instructions for use with a 6 month old child.

7.1.2 If the carrier contains an adjustable waist restraint, adjust it using the webbing tension pull device shown in Fig. 3, so that a force of 2 lbf (9 N) applied to the waist restraint will

15 lbf (67 N)  
Maximum Tension



FIG. 3 Tension Test Adapter/Clamp

that the carrier has all of the same adjustment positions set in 7.1.1 – 7.1.3. For any straps or restraints that need to be loosened in order to remove CAMI, mark the webbing of the straps/restraints before loosening to help ensure that the same adjustment position can be repeated.

7.1.5 Place the Leg Opening Test Sphere (Fig. 4) in the carrier leg opening and gradually tilt the carrier, over a period of 5 s, in a manner such that the leg opening of the carrier is horizontal.

7.1.6 Allow the sphere to rest in the opening for an additional 1 min.

7.1.7 Repeat 7.1.5 and 7.1.6 for the other leg opening.

7.2 Dynamic Strength Test:

7.2.1 Position, secure, and adjust the frame child carrier onto the test torso (see Fig. 5) in accordance with the manufacturer’s instructions.

7.2.2 Position a weight of 40 lb (18.1 kg) or the manufacturer’s maximum recommended weight for the occupant, whichever is greater, using a 6 in. to 8 in. (152 mm to 203 mm) diameter shot bag in the seat of the frame child carrier. Adjust all straps to firmly retain the shot bag in the same or similar manner as the instruction manual directs that the straps should be adjusted on the child occupant during actual use. If necessary, the test mass may be retained within the carrier using any suitable means that does not affect the test results.

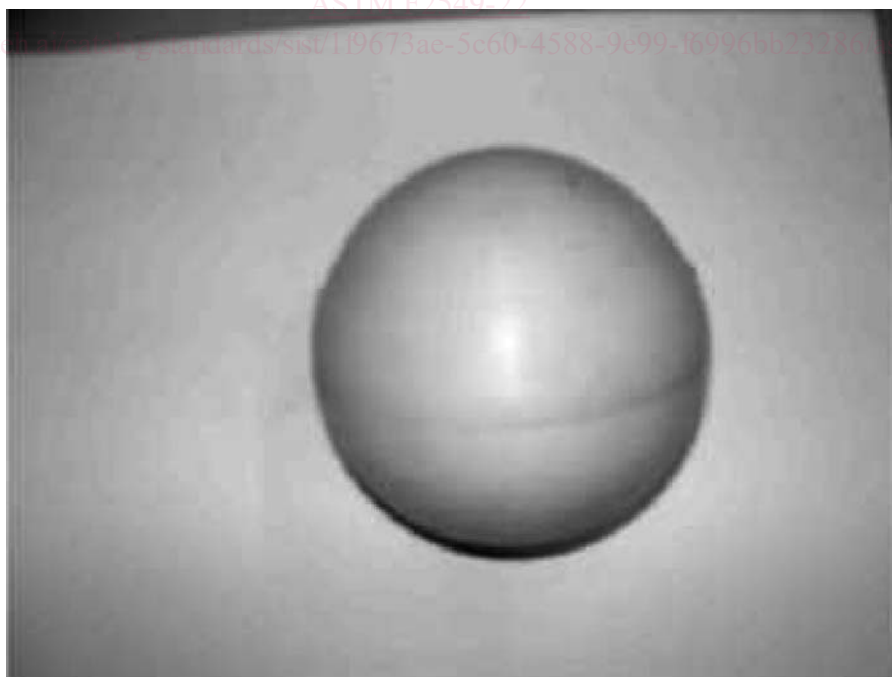
7.2.3 Pockets, pouches, and other carrying receptacles of the product shall be loaded with weight(s) up to the manufacturer’s maximum recommended weight(s), in such a way that will create the most onerous test condition. The most onerous test condition may include no weight(s) or lower than maximum weight(s) in some receptacles.

provide between ¼ in. and ½ in. (6 mm and 12.7 mm) space between the waist restraint and the CAMI Dummy.

7.1.3 Repeat 7.1.2 with the both shoulder restraints and any adjustment straps, if applicable.

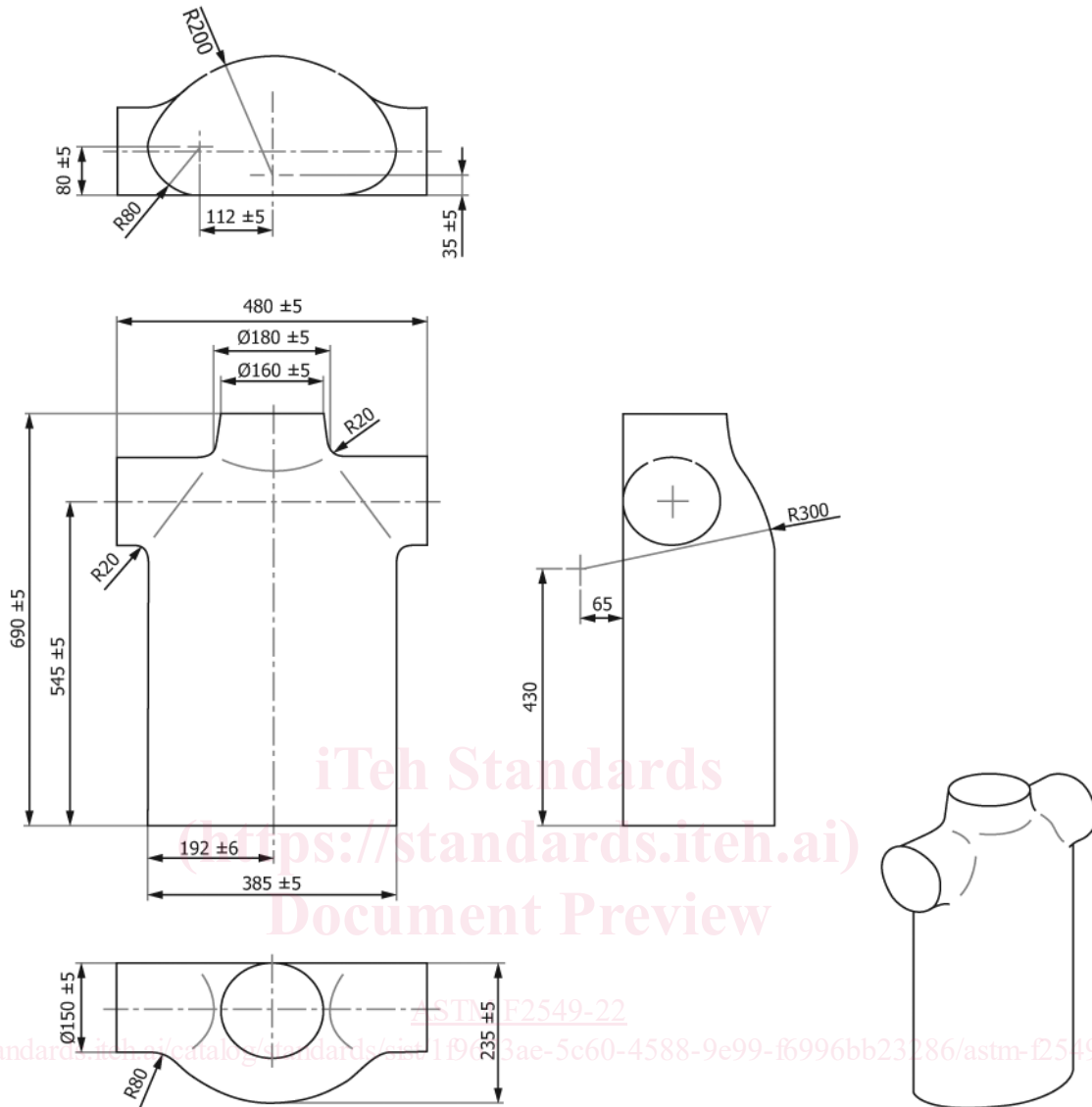
NOTE 2—The webbing tension pull device is required to determine proper restraint system fit in the waist and shoulder straps.

7.1.4 Unfasten all restraints and straps, taking care as to not change the settings at which they were adjusted, and remove CAMI from the frame carrier. Re-fasten all the restraints so



NOTE 1—Sphere shall be fabricated from a smooth, rigid material weighted to 7.0 lb (3.20 kg). Sphere is machined to 16.5 in. (419.1 mm) circumference.

FIG. 4 Leg Opening Test Sphere



NOTE 1—A rigid torso with dimensions as specified in the figure is fitted to a rigid plate.

FIG. 5 Test Torso

7.2.4 Conduct ten cycles of alternating vertical sinusoidal movement through 4.75 in.  $\pm$  0.25 in. at a frequency of 2 Hz ( $\pm 10\%$ ). Mark the position of all adjustable components comprising the occupant retention system and attachment system.

7.2.5 Conduct an additional 90 cycles and measure the slippage of all adjustable components comprising the occupant retention system and attachment system.

7.2.6 Readjust the adjustable components to the position(s) marked in 7.2.4. Prevent any slippage of the adjustable components by any suitable means such as a clamp or other device that will not affect the outcome of the test. Conduct an additional 49 900 cycles. Evaluate the product condition with respect to the hazards prohibited by 6.2.

7.2.7 If the frame child carrier is designed to allow it to stand freely in the upright position, the following test will be performed.

7.2.7.1 Secure the frame child carrier in the manufacturer's use position to a horizontal test plane.

7.2.7.2 Position a weight of 40 lb (18.1 kg) or the manufacturer's maximum recommended weight for the occupant, whichever is greater, using a 6 in. to 8 in. (152 mm to 203 mm) diameter shot bag, in the seat of the frame child carrier.

7.2.7.3 Lift the weight a vertical distance of 3 in. (75 mm) from the seat surface and drop onto the seat. Perform the drop test a total of 500 times with a cycle time of  $4 \pm 1$  s/cycle. If required, adjust the drop height to maintain the 3 in. (75 mm).

7.3 Static Load Test:

7.3.1 Position, secure, and adjust the frame child carrier onto the test torso (see Fig. 5) in accordance with the manufacturer’s instructions.

7.3.2 Using a 6 in. (150 mm) Standard Weld Cap (see Fig. 6), center a weight equal to three times the maximum manufacturer’s recommended weight in the seat area of the frame child carrier. Include the weight of the weld cap. Gradually apply the weight within a 5 s period and maintain for an additional 1 min.

7.3.3 If the frame child carrier is designed to allow it to stand freely in the upright position, repeat the Static Load Test of 7.3.2 with the frame child carrier placed on a concrete floor that may be covered with 1/8 in. (3 mm) thick vinyl floor covering.

7.4 Stability Test:

7.4.1 Place the frame child carrier in the manufacturer’s use position with all frame members on a 12° smooth inclined surface. If the carrier is designed with adjustable seat heights, test in the highest use position.

7.4.2 Place a stop on the plane against the frame in a manner that will prevent the frame child carrier from moving on the plane, but will not prevent tipping.

7.4.3 Configure a weighted vest (Fig. 7) and CAMI Infant Dummy, Mark II to attain a combined weight of 40 lb (18.1 kg) or equal to the manufacturer’s maximum recommended weight for the occupant, if greater.

7.4.4 Place a CAMI Infant Dummy, Mark II and the weighted vest in the frame child carrier with the retention system adjusted in accordance with the manufacturer’s instructions.

7.4.5 Position the frame child carrier on the plane in all orientations that present maximum tendency for the unstable condition to exist.

7.5 Retention System:

7.5.1 Secure the frame child carrier to a horizontal test plane so that it cannot move vertically or horizontally.

7.5.2 Apply a force of 45 lbf (200 N) to a single attachment point of the retention system in the normal use direction(s) that stress would be applied to that attachment. Gradually apply the force within 5 s and maintain for an additional 10 s.

7.5.3 Place a CAMI Infant Dummy, Mark II in the frame child carrier with the retention system adjusted in accordance with the manufacturer’s instructions.

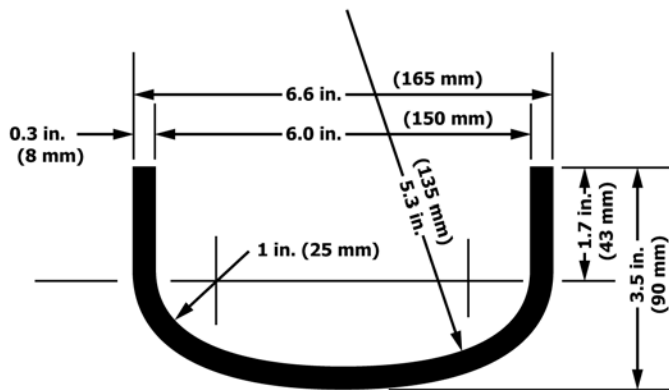


FIG. 6 Standard 6 in. (150 mm) Weld Cap

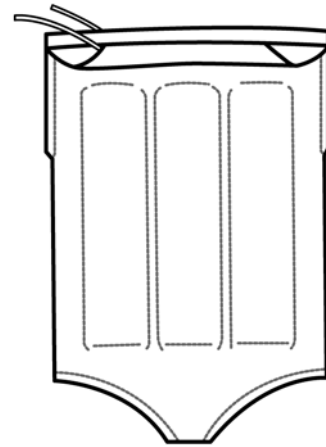


FIG. 7 Weight Vest

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

7.5.5 Repeat this procedure five times with a maximum interval of 5 s between tests.

7.5.6 Release the frame child carrier from its attachment to the test plane.

7.5.7 Reposition the CAMI Infant Dummy, Mark II in the frame child carrier without adjusting the retention system.

7.5.8 By any convenient means, lift the frame child carrier and rotate it backwards 360° around an axis approximating the intersection of the seat back and bottom. The rotation must hesitate for a minimum of 1 s every 90°.

7.5.9 Rotate the frame child carrier 360° around an axis approximating the side edge of the seat bottom. The rotation must hesitate for a minimum of 1 s every 90°.

7.6 Handle Integrity:

7.6.1 Secure the frame child carrier to a horizontal test plane so that it cannot move vertically or horizontally.

7.6.2 Apply a pull force to the handle equal to three times the maximum manufacturer’s recommended weight in the normal use direction(s) that stress would be applied. Gradually apply the force within 5 s and maintain for an additional 30 s.

7.6.3 Repeat this procedure a total of five times on each handle of the frame child carrier.

7.7 Permanency of Labels and Warnings:

7.7.1 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.

7.7.2 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.

7.7.3 A warning label attached by a seam shall be considered permanent if it does not detach when subjected to a 15 lbf (67 N) pull force applied in any direction most likely to cause