UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
BETHESDA, MD 20814

This document has been electronically approved and signed.

Memorandum

JUL 12 2010

TO : The Commission
Todd A. Stevenson, Secretary

THROUGH: Cheryl A. Falvey, General Counsel
Kenneth R. Hinson, Executive Director

FROM : DeWane Ray, Deputy Assistant Executive Director, Office of Hazard Identification and Reduction
Patricia L. Edwards, Project Manager Directorate for Engineering Sciences

SUBJECT : Staff's Draft Proposed Rules for Non-Full Size Cribs/Correction to Tab E Appendix A

Attached is a revised Appendix A to Tab E of staff's briefing package dated June 30, 2010, regarding the proposed rule for non-full-size cribs. The attachment includes a redline version of Appendix A that highlights changes from the June 30, 2010 version. This appendix contains the details of staff's recommendations for changes to the non-full-size crib standard for the NPR. This appendix was revised to correct some of the requirements that were incorrectly referenced in the test mattress specification (Section 1, 8.x.2.5).

In addition, between the time the appendix was written and the time of the staff briefing on July 7, 2010, ASTM published the approved versions of their 2010 crib standards, ASTM F 1169-10 and F 406-10. Language in the appendix was intended to be identical to some of the language found in ASTM F 1169-10. Thus, changes were also made to honor this intent. In addition, some figures and language contained in the Appendix were removed because they were duplicative of information found in ASTM F 406-10.

RA 7/12/2010
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THIS DOCUMENT HAS NOT BEEN REVIEWED OR ACCEPTED BY THE COMMISSION.

APPENDIX A – Recommended Language for Mandatory Standard (Revised July 12, 2010)

1. Recommended Language for the Mattress Support System Vertical Impact Test

6.x *Mattress Support System Vertical Impact Test Requirements:*

After testing in accordance with the procedure in 7.x, the crib shall comply with the requirements of section 5. Key structural elements attached by screws shall not have separated by more than 0.04 in. (1.00 mm) upon completion of testing.

8.x *Mattress Support System Vertical Impact Test*:

8.x.1 *General* -- This test consists of dropping a specified weight repeatedly onto a polyurethane foam pad covered in vinyl supported by the crib mattress support system. The test assists in evaluating the structural integrity of the crib assembly.

8.x.2 *Apparatus*
8.x.2.1 A guided free-fall impacting system machine (which keeps the upper surface of the impact mass parallel to the horizontal surface on which the crib is secured) (see Figure A.12)
8.x.2.2 A 45 lb (20 kg) impact mass (see Figures A and B).
8.x.2.3 A 6 inch (150 mm) long gauge.
8.x.2.4 A 2 inch (50 mm) square gauge/spacer block.
8.x.2.5 A test mattress with a 3 in. (75 mm) thick sheet of polyurethane foam having a density of 1.9 +/- 0.4 lbs./ft3 (30 +/- 6 kg/m3), a 25% indentation force deflection (IFD) of 32.4 +/- 6.7 lbs. (144 +/- 30 N) and dimensions that shall not be more than 1 in (25 mm) shorter and 1 inches (25 mm) narrower than the respective interior dimensions of the product, covered with a tight fitting 8 to 12 gauge vinyl material (tick). The suitability of the test mattress dimensions are to be determined by placing the mattress on the mattress support and pushing it fully over to one side. Measure the gap formed between the mattress and the crib side/end assemblies, which should not be greater than 1 in. (25 mm) in both the length and width.

8.x.3 *Procedure*
8.x.3.1 Adjust the mattress support to its lowest position.
8.x.3.2 Put the test mattress in place. Do NOT use the mattress supplied with the crib. The same test mattress may be used for testing more than one crib if it meets the requirements of 7.2.2.5.
8.x.3.3 Secure the product to the horizontal test plane, remove the castors if supplied. Once the test has begun, no attempt shall be made at re-tightening fasteners which may have loosened because of vibration. The test must proceed without any corrective

intervention of adjusting the height difference between the drop weight and mattress, until its completion, unless extensive damage, dislodging or deformation occurs during the course of the test, in which case the test shall be terminated.

8.x.3.4 Position the geometric center of the test mattress below the geometric center of the impact mass.

8.x.3.5 Adjust the distance between the top surface of the mattress and bottom surface of the impact mass to 6 inches (150 mm) (using the 7.2.2.3 6 inch (150 mm) long gauge) when the impact mass is in its highest position. Lock the impactor mechanism at this height and DO NOT adjust the height during impacting to compensate for any change in distance due to the mattress compressing or the mattress support deforming or moving during impacting.

8.x.3.6 Allow the 45 lb (20.0 kg) impact mass to fall freely 150 times at the rate of one impact every 4 (four) seconds. Load retraction shall not begin until at least 2 seconds after the start of the drop.

8.x.3.7 Repeat step 7.2.3.6 at each corner of the mattress support, with the center of the impact mass 6 inches (150 mm) from the two sides forming the corners of the crib. To position the mass for a standard rectangular shaped crib place a 2 inch (50 mm) spacer block against one of the sides of the corner to be tested and move the impact mass until it touches the spacer block (see Figure C). Repeat this process for the other side that makes up the corner to be tested (see Figure D).

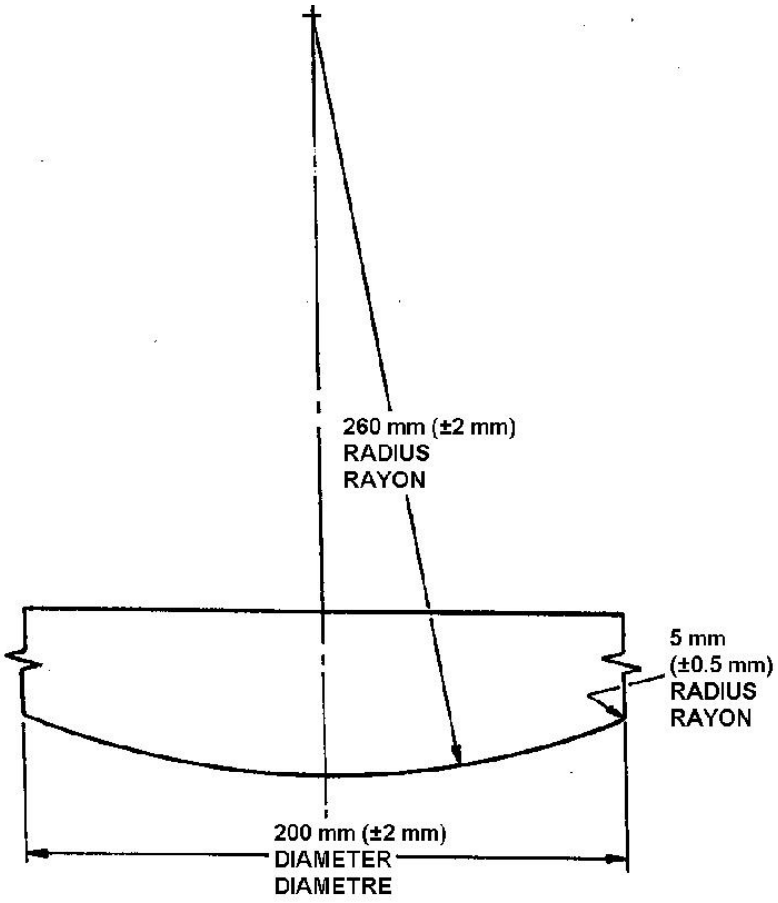

Figure A. Impactor Mass Shape

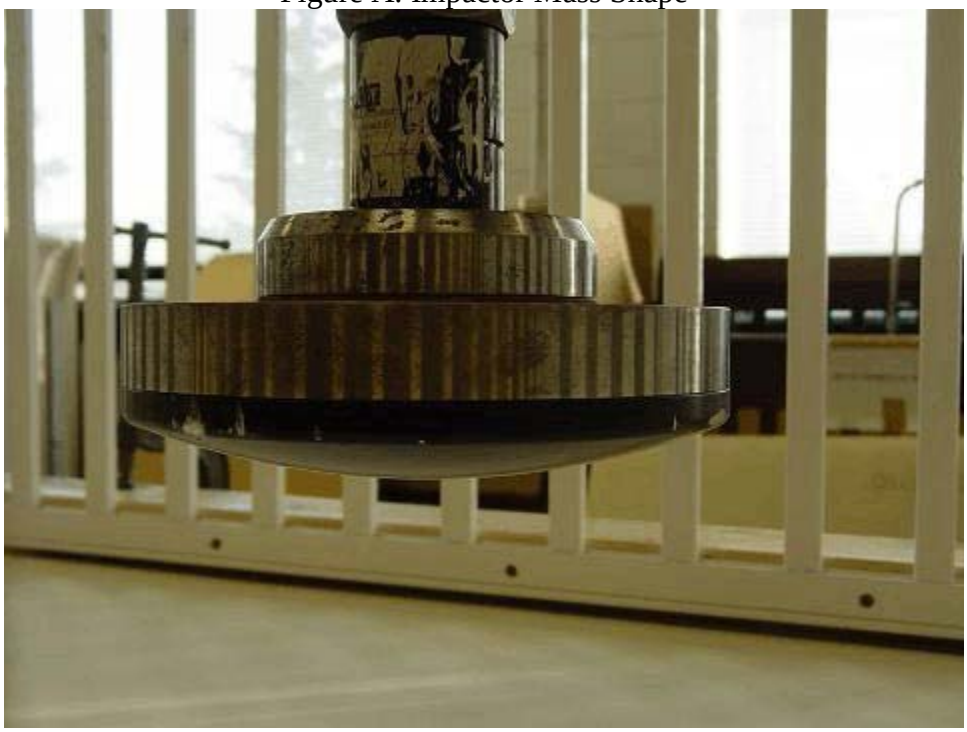

Figure B. Impact Mass

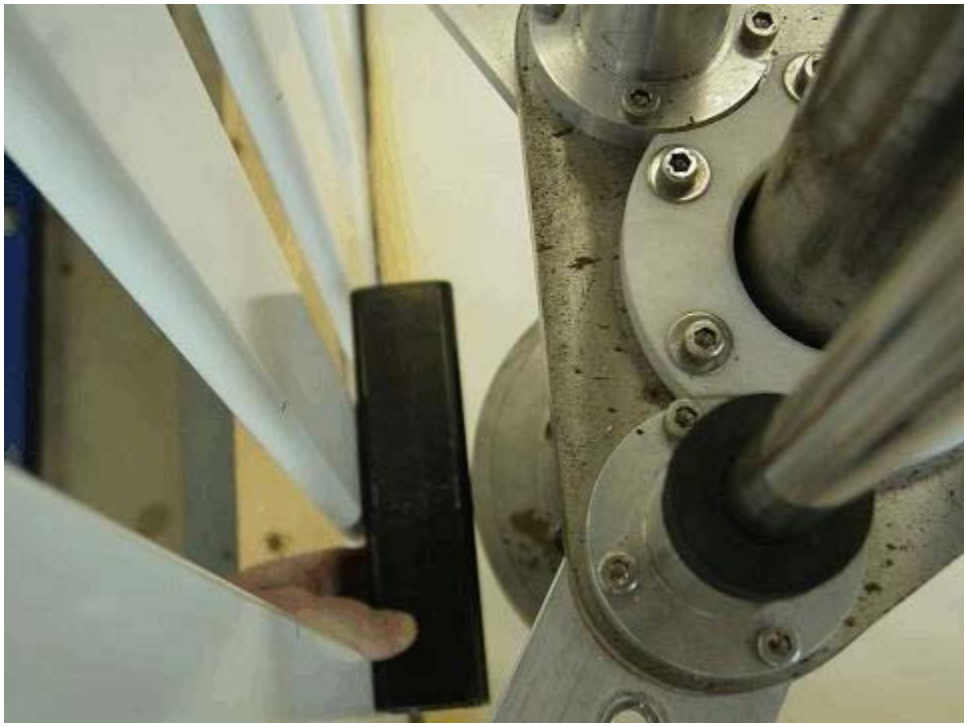

Figure C. Spacer Block (Top View)

Figure D. Impact Mass and Spacer Block

2. Recommended Language for the NFS Crib Side Impact Test

The changes recommended by staff to the crib side impact test are (**bold font** indicates new language):

- *Section 8.x.x.x: Impactor with contact dimensions of 1.5 by 1 inch (38 by 25 mm) and a weight of **30** lb. (13.6 kg) with the 1 inch (25 mm) positioned perpendicular to the length of the frame.*

- *Section 8.x.x.y: Allow the impactor to free-fall 3 + ½, -0 in. (76 + 13, -0 mm) **250** times at a rate…*

Finally, the language for the new performance pass-fail requirement, as written F 1169-10, should be:

> *Section 6.x.y:* ***After completion of the cyclic and static portions of the side tests, the crib shall comply with the General Requirements in section 5, and no spindles or slats shall have broken or completely separated from the top or bottom rail. Complete separation shall be determined by placing a right triangular prism shaped wedge (see Fig. A1.13) between two spindles or slats adjacent to the rail from which these have separated and applying a 20-lbf (90-N) pull force to the wedge in a direction normal to the plane of the crib side. If a spindle or slat moves away from the hole in the rail in which it was formerly secured, complete separation has occurred.***

3. <u>Recommended Language for the Spindle/Slat Torque Test</u>

The torque test performance requirement language used in ASTM F 1169-10 is recommended to be inserted in the "Side and End Impact Testing" sub section of the NFS crib standard F 406-10. The recommended new language is given below in ***bold***:

- *Performance Requirement, Section 6.x.x:* ***Any spindles or slats that could be rotated during the torque test shall comply with the spacing of crib components in the Performance Requirements section 6.3.1 when turned to their most adverse position.***

Staff recommends that the corresponding test method be added as the last sub-section of the "Side and End Impact Test for Rigid Sided Products" section. The recommended language is taken directly from ASTM F 1169-10 (new language in ***bold***):

- *Test Method, Section 8.x.x:* ***Crib Side Spindle/Slat Torque Test: Apply a torque of 30 lbf-in. (3.4 N-m) at the midpoint in height of each spindle or slat.***

4. <u>Recommended Language for NFS Crib Movable Side Latch Test</u>

6.x.1 *Movable Side Latch Testing*:

6.x.1.1 This test consists of horizontally loading the end while a prescribed force is applied to the movable side(s) (see 8.x.x).
6.x.1.2 The latching mechanism shall not disengage during testing and shall continue to function in the intended manner upon completion of the testing.

8.x.x *Procedure for Movable Side Latch Tests*:
8.x.x.1 Gradually apply within 5 s a vertically downward force of 60 lbf (270 N) through a hardwood block with 2-by-2-in. (50-by-50-mm) contact area to the upper horizontal rail of the unit side at a point that is 6 in. (150 mm) from one end of the movable side rail. While the 60-lbf (270-N) downward force is applied to the movable side, gradually apply within 5 s a 30-lbf (133-N) horizontal force in a direction parallel to the movable side. The point of application of this force is to be coincident with the horizontal extension of the longitudinal centerline of the movable side and 1 in. (25 mm) down from the top of the unit corner post or unit end panel for construction not incorporating unit corner posts (see Fig. A1.19). Maintain this horizontal force for an additional 30 s, then reverse its direction and maintain for an additional 30 s.
8.x.x.2 Repeat this procedure at the other end of the unit movable side and, if the unit has more than one movable side, perform the test at each end of each movable side.
8.x.x.3 Upon completion of the test, release the movable side latch and operate the movable side. Then raise the side and observe whether the latch automatically engages in the manner intended by the manufacturer.

5. Recommended Language for the Order of Structural Tests

Section 6.x Performance Testing Order

The performance testing requirements of this section shall be performed in the following order:

1. Teething rail test
2. Cyclic side shake test
3. Crib side latch test
4. Mattress support system vertical impact test
5. Mattress support system test
6. Crib side impact test
7. Spindle/slat strength test

Rationale:
The teething rail test should precede the other testing as it does not relate to the structural integrity of the product. Cyclic side shake testing should come next as the 72,000 cycles will subject the entire product to the simulated stresses that a non-full-size crib would undergo during a lifetime of shaking by a user. Crib side latch testing should immediately follow the cyclic testing as this is the assembly which would most likely to be affected by cyclic stresses. This should then be followed by the vertical impact testing and the mattresses support testing which is the assembly most likely to the affected by the vertical impact stresses. This should then be

followed by the crib side impact which subjects the side rails to repeated impacts. The spindle/slat strength test should come last as these structural elements are the most likely to be affected by the sum of all the preceding cyclic and impact tests.

APPENDIX A – Recommended Language for Mandatory Standard (Revised July 12, 2010) Redline Version

1. Recommended Language for the Mattress Support System Vertical Impact Test

6.x *Mattress Support System Vertical Impact Test Requirements:*

After testing in accordance with the procedure in 7.x, the crib shall comply with the requirements of section 5. Key structural elements attached by screws shall not have separated by more than 0.04 in. (1.00 mm) upon completion of testing.

8.x *Mattress Support System Vertical Impact Test*:

8.x.1 *General* -- This test consists of dropping a specified weight repeatedly onto a polyurethane foam pad covered in vinyl supported by the crib mattress support system. The test assists in evaluating the structural integrity of the crib assembly.

8.x.2 *Apparatus*
8.x.2.1 A guided free-fall impacting system machine (which keeps the upper surface of the impact mass parallel to the horizontal surface on which the crib is secured) (see Figure A.12)
8.x.2.2 A 45 lb (20 kg) impact mass (see Figures ~~B~~A and ~~C~~B).
8.x.2.3 A 6 inch (150 mm) long gauge.
8.x.2.4 A 2 inch (50 mm) square gauge/spacer block.
8.x.2.5 A test mattress with a 3 ~~inch~~in. (75 mm) thick sheet of polyurethane foam having a density of 1.9 ~~2~~ +/- 0.4 lbs./ft3 (30 +/- 6 kg/m3), a 25% indentation ~~load~~force deflection (IFD) of ~~33-37~~32.4 +/- 6.7 lbs. (144 +/- 30 N) and dimensions that shall not be more than 1 ~~inches~~in (25 mm) shorter and 1 inches (25 mm) narrower than the respective interior dimensions of the product, covered with a tight fitting 8 to 12 ~~gage~~gauge vinyl material (tick). The suitability of the test mattress dimensions are to be determined by placing the mattress on the mattress support and pushing it fully over to one side. Measure the gap formed between the mattress and the crib side/end assemblies, which should not be greater than 1 in ~~(~~. (25 mm) in both the length and width.

8.x.3 *Procedure*
8.x.3.1 Adjust the mattress support to its lowest position.
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8.x.3.3 Secure the product to the horizontal test plane, remove the castors if supplied. Once the test has begun, no attempt shall be made at re-tightening fasteners which may have loosened because of vibration. The test must proceed without any corrective intervention of adjusting the height difference between the drop weight and mattress,

until its completion, unless extensive damage, dislodging or deformation occurs during the course of the test, in which case the test shall be terminated.

8.x.3.4 Position the geometric center of the test mattress below the geometric center of the impact mass.

8.x.3.5 Adjust the distance between the top surface of the mattress and bottom surface of the impact mass to 6 inches (150 mm) (using the 7.2.2.3 6 inch (150 mm) long gauge) when the impact mass is in its highest position. Lock the impactor mechanism at this height and DO NOT adjust the height during impacting to compensate for any change in distance due to the mattress compressing or the mattress support deforming or moving during impacting.

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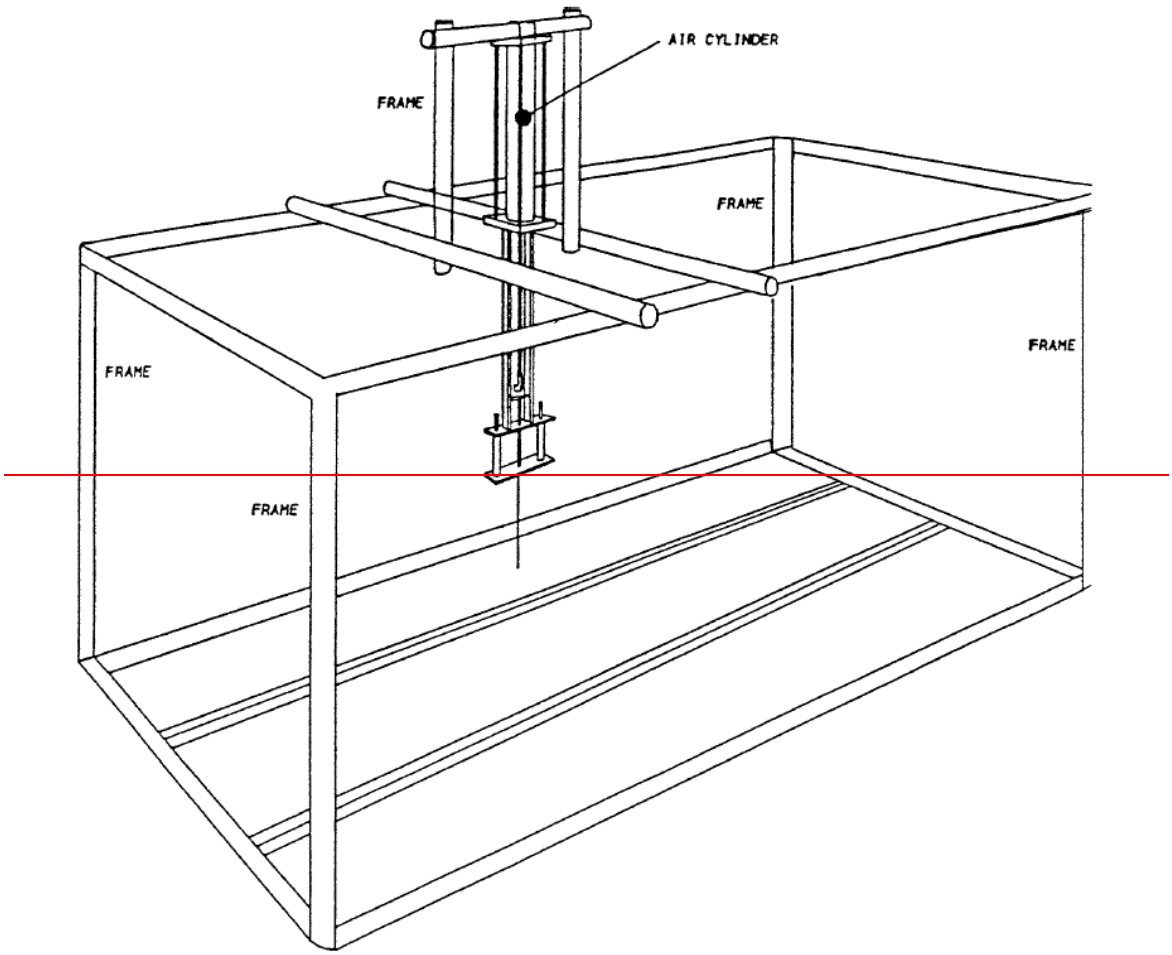
8.x.3.7 Repeat step 7.2.3.6 at each corner of the mattress support, with the center of the impact mass 6 inches (150 mm) from the two sides forming the corners of the crib. To position the mass for a standard rectangular shaped crib place a 2 inch (50 mm) spacer block against one of the sides of the corner to be tested and move the impact mass until it touches the spacer block (see Figure ~~D~~C). Repeat this process for the other side that makes up the corner to be tested (see Figure ~~E~~D).



~~**Figure A. Typical test frame**~~

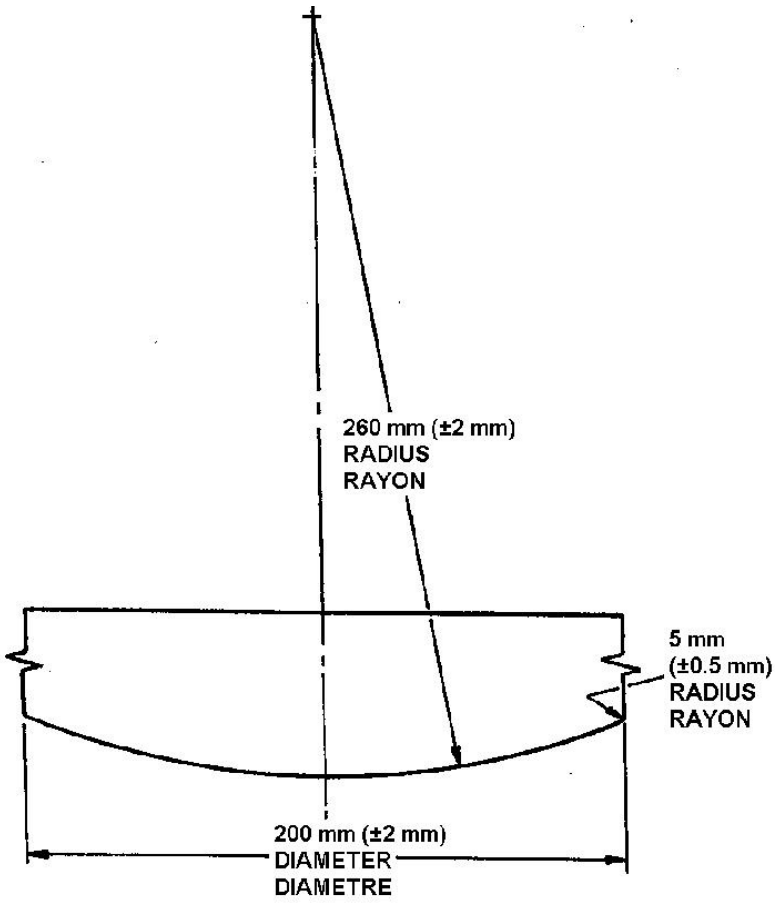


Figure A. ~~**Typical test frame**~~Impactor Mass Shape

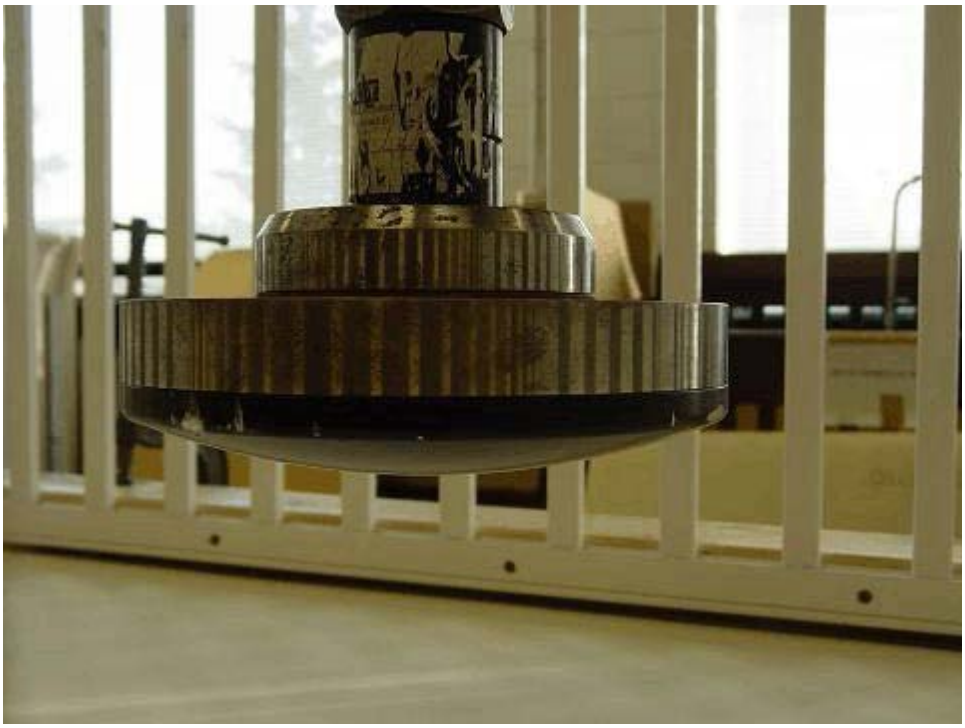


Figure B. ~~-~~Impact ~~**mass shape**~~Mass

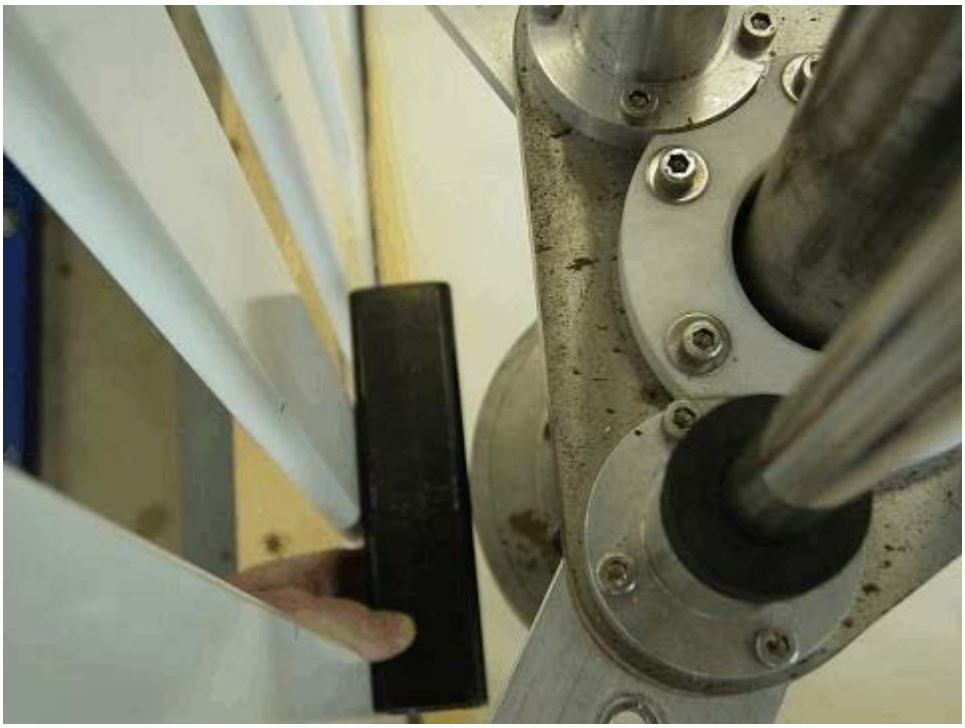


Figure C. ~~**Impact mass**~~Spacer Block (Top View)

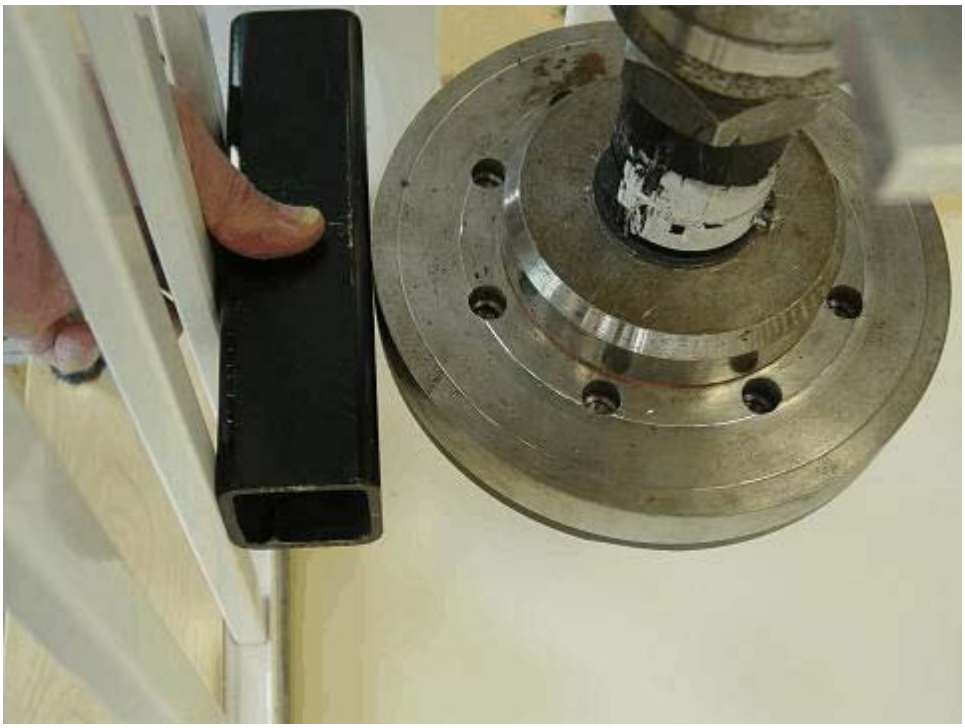
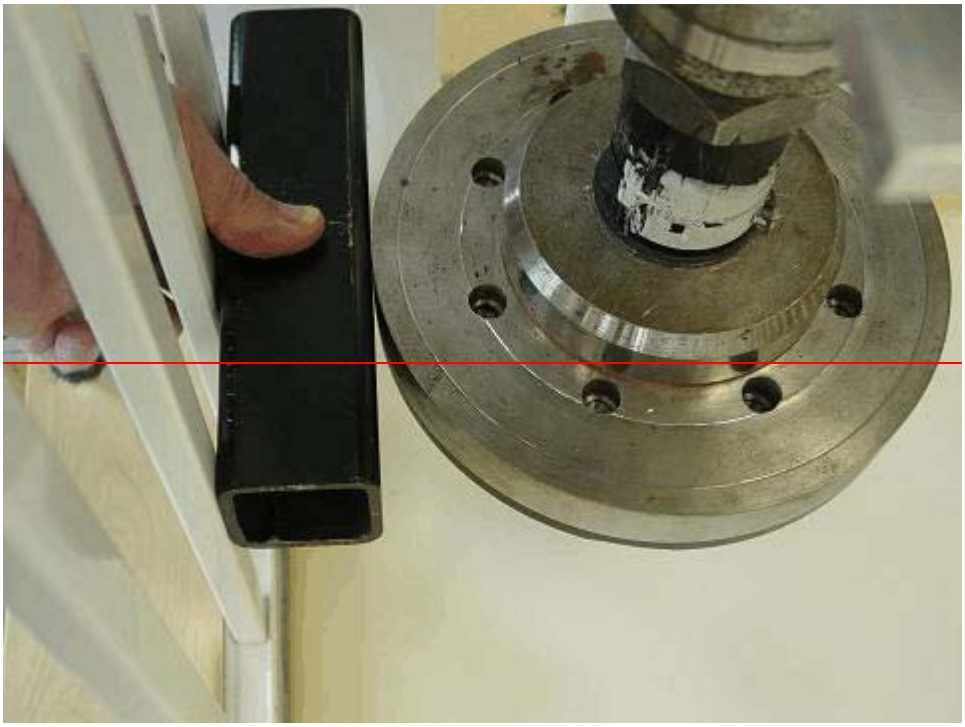


Figure D. Impact Mass and Spacer ~~block (top view)~~Block



~~Figure E.~~ 2. Recommended Language for the NFS Crib Side Impact ~~mass and spacer block~~Test

The changes recommended by staff to the crib side impact test are (**bold font** indicates new language):

- *Section 8.x.x.x: Impactor with contact dimensions of 1.5 by 1 inch (38 by 25 mm) and a weight of **30** lb. (13.6 kg) with the 1 inch (25 mm) positioned perpendicular to the length of the frame.*

- *Section 8.x.x.y: Allow the impactor to free-fall 3 + ½, -0 in. (76 + 13, -0 mm) **250** times at a rate…*

Finally, the language for the new performance pass-fail requirement, as written F 1169-10, should be:

Section 6.x.y: ***After completion of the cyclic and static portions of the side tests, the crib shall comply with the General Requirements in section 5, and no spindles or slats shall have broken or completely separated from the top or bottom rail. Complete separation shall be determined by placing a right triangular prism shaped wedge (see Fig. A1.13) between two spindles or slats adjacent to the rail from which these have separated and applying a 20-lbf (90-N) pull force to the wedge in a direction normal to the plane of the crib side. If a spindle or slat moves away from the hole in the rail in which it was formerly secured, complete separation has occurred.***

3. Recommended Language for the Spindle/Slat Torque Test

The torque test performance requirement language used in ASTM F 1169-10 is recommended to be inserted in the "Side and End Impact Testing" sub section of the NFS crib standard F 406-10. The recommended new language is given below in ***bold***:

- *Performance Requirement, Section 6.x.x:* ***Any spindles or slats that could be rotated during the torque test shall comply with the spacing of crib components in the Performance Requirements section 6.3.1 when turned to their most adverse position.***

Staff recommends that the corresponding test method be added as the last sub-section of the "Side and End Impact Test for Rigid Sided Products" section. The recommended language is taken directly from ASTM F 1169-10 (new language in ***bold***):

- *Test Method, Section 8.x.x:* ***Crib Side Spindle/Slat Torque Test: Apply a torque of 30 lbf-in. (3.4 N-m) at the midpoint in height of each spindle or slat.***

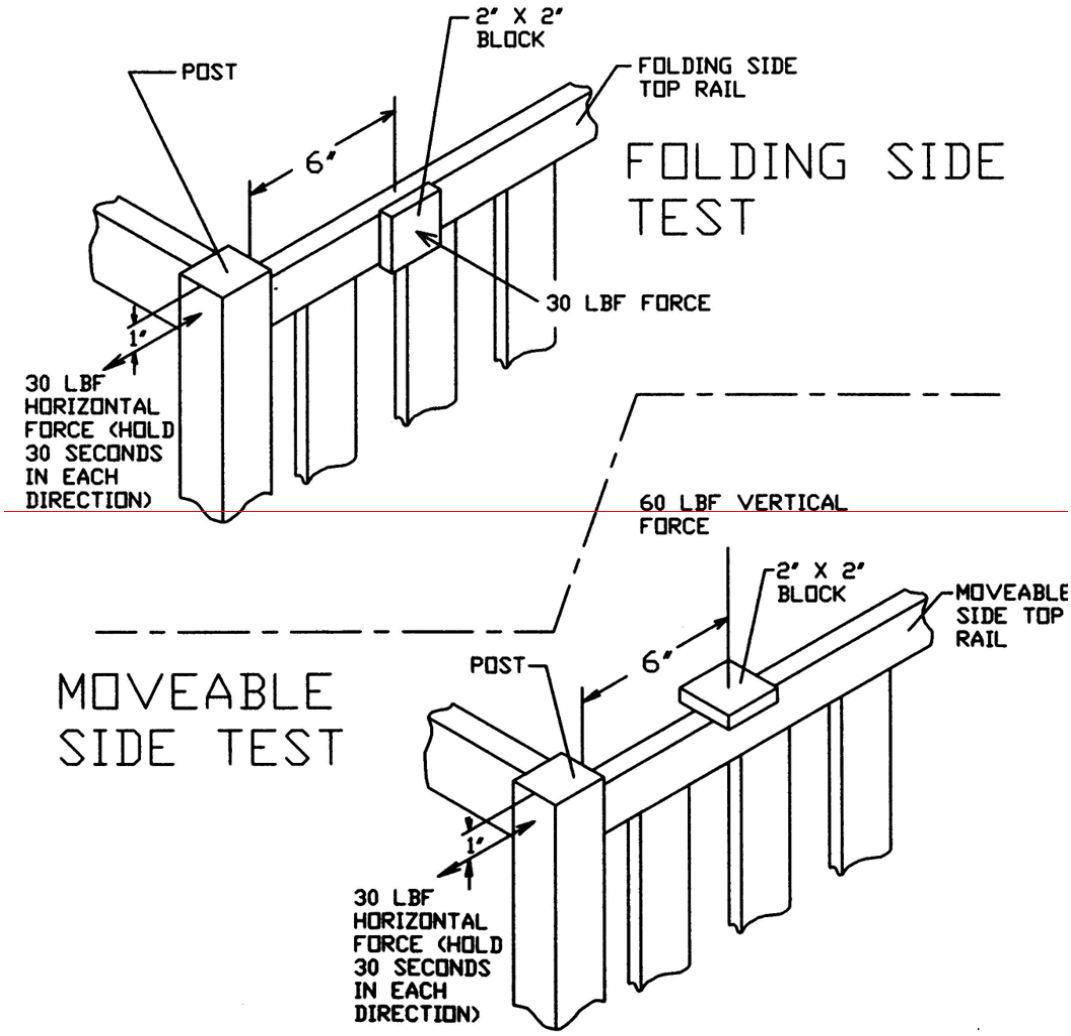
4. Recommended Language for NFS Crib Movable Side Latch Test

6.x.1 *Movable Side Latch Testing*:

6.x.1.1 This test consists of horizontally loading the end while a prescribed force is applied to the movable side(s) (see 8.x.x ~~or 8.x.y~~).
6.x.1.2 The latching mechanism shall not disengage during testing and shall continue to function in the intended manner upon completion of the testing.

8.x.x *Procedure for Movable Side Latch Tests*:
8.x.x.1 Gradually apply within 5 s a vertically downward force of 60 lbf (270 N) through a hardwood block with 2-by-2-in. (50-by-50-mm) contact area to the upper horizontal rail of the unit side at a point that is 6 ~~1/2~~ in. (~~152 6 13~~150 mm) from one end of the movable side rail. While the 60-lbf (270-N) downward force is applied to the movable side, gradually apply within 5 s a 30-lbf (133-N) horizontal force in a direction parallel to the movable side. The point of application of this force is to be coincident with the horizontal extension of the longitudinal centerline of the movable side and 1 ~~6 1/2~~ in. (25~~6 13~~ mm) down from the top of the unit corner post or unit end panel for construction not incorporating unit corner posts (see Fig. ~~F~~A1.19). Maintain this horizontal force for an additional 30 s, then reverse its direction and maintain for an additional 30 s.
8.x.x.2 Repeat this procedure at the other end of the unit movable side and, if the unit has more than one movable side, perform the test at each end of each movable side.
8.x.x.3 Upon completion of the test, release the movable side latch and operate the movable side. Then raise the side and observe whether the latch automatically engages in the manner intended by the manufacturer.

~~8.x.y *Procedure for Horizontally Hinged Movable Side Latch Test*:~~
~~8.x.y.1 Place the hinged movable side in the latched position. Through a hardwood block with contact area of 2 by 2-in. (50 by 50-mm), gradually apply within 5 s a force of 30 lbf (130 N) horizontally outward, perpendicular to, and at a point that is 6 1/2 in. (152 6 13 mm) from one end of the hinged movable side upper rail. While this 30-lbf (130-N) force is applied to the movable side, gradually apply within 5 s a 30-lbf (130-N) horizontal force in a direction parallel to the hinged side. The point of application of this force is to be coincident with the horizontal extension of the longitudinal centerline of the hinged movable side and 1 6 1/2 in. (25 6 13 mm) down from the top of the unit corner post or unit end panel for construction not incorporating unit corner posts (see Fig. 15). Maintain this horizontal force for an additional 30 s, then reverse its direction and maintain for an additional 30 s.~~
~~8.x.y.2 Place the hinged movable side in the latched position. Through a hardwood block with contact area of 2 by 2-in. (50 by 50-mm), gradually apply within 5 s a force of 30 lbf (130 N) horizontally inward, perpendicular to, and at a point that is 6 1/2 in. (152 6 13 mm) from one end of the hinged movable side upper rail. While this 30-lbf (130-N) force is applied to the movable side, gradually apply within 5 s a 30-lbf (130-N) horizontal force in a direction parallel to the hinged movable side. The point of application of this force is to be coincident with the horizontal extension of the longitudinal centerline of the hinged movable side and 1 6 1/2 in. (25 6 13 mm) down from the top of the unit corner post or unit end panel for construction not incorporating unit corner posts. Maintain this horizontal force for an additional 30 s, then reverse its direction and maintain for an additional 30 s.~~



~~**Figure F. Side Latch Test**~~

5. Recommended Language for the Order of Structural Tests

Section 6.x Performance Testing Order

The performance testing requirements of this section shall be performed in the following order:

8. Teething rail test
9. Cyclic side shake test
10. Crib side latch test
11. Mattress support system vertical impact test
12. Mattress support system test
13. Crib side impact test
14. Spindle/slat strength test

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