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## 1 SCOPE

1.1 This method describes test procedures for cribs and cradles to verify whether the product meets the requirements of the *Cribs and Cradles Regulations* (SOR/86-962, 11 September, 1986). The numerical values of performance measures are based upon regulatory requirements. The tolerances for these values have been chosen such that no test parameter applied to the product results in a more severe condition than that specified in the regulations, with the understanding that uncertainty of measurement is always present. The product is evaluated by performing the following test sections in sequence:


- 4.1 Examination of Container for Damage and Labelling
- 4.2 Examination of the Product for Damage and Labelling
- 4.3 Reference to the *Hazardous Products Act* or the *Cribs and Cradles Regulations*
- 4.4 Warning Statements
- 4.5 Permanency of the Labels and Pouch
- 4.6 Indelibility of the Printing
- 4.7 Assembly of the Crib or Cradle in Accordance with the Instructions Supplied
- 4.8 Marking of Product for Testing Purposes
- 4.9 Latching and Locking
- 4.10 Swing
- 4.11 Mattress
- 4.12 Mattress Support Heights
- 4.13 Corner Posts
- 4.14 Threaded Bolt Ends
- 4.15 Coil Springs
- 4.16 90 N Push/pull
- 4.17 Small Components

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- 4.18 Sharp Edges and Sharp Points
- 4.19 Open Holes
- 4.20 Entanglement
- 4.21 Shearing or Pinching
- 4.22 Slat Spacing
- 4.23 120 N Alternating Horizontal Force
- 4.24 120 N Alternating Vertical Force
- 4.25 250 N Individual Upward Force (Backloading)
- 4.26 250 N Simultaneous Upward Forces (Backloading)
- 4.27 200 N Force in Any Direction
- 4.28 Impact
- 4.29 8 N•m Torque
- 4.30 500 N Pull
- 4.31 Mesh Opening Size

## 2 APPLICABLE DOCUMENTS

- 2.1 The Hazardous Products Act (HPA).
- 2.2 HPA, Cribs and Cradles Regulations (SOR/86-962, 11 September, 1986) hereinafter referred to as the Regulations.
- 2.3 Book 5, Reference Manual, Laboratory Policies and Procedures, Product Safety Laboratory (PSL) hereinafter referred to as Book 5.
- 2.4 Test Method M00.1 (Small Components), Book 5.
- 2.5 Test Method M00.2 (Sharp Edges), Book 5.
- 2.6 Test Method M00.3 (Sharp Points), Book 5.
- 2.7 Test Method M08 (Playpens), Book 5.

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- 2.8 PSL Project Report 99-0530: New Linear Actuator Alternating Force Application Testing Apparatus used for Testing Standard Cribs.
- 2.9 PSL Project Report 2005-0555: Revised Method: TEST METHOD FOR CRIBS AND CRADLES.
- 2.10 PSL Project Report 2004-0824: COMPUTERIZED LVDT BASED IMPACT TESTING DEVICE FOR CRIBS AND CRADLES

### 3 SAMPLING

- 3.1 The following test procedures are conducted on one specimen.

### 4. TESTING PROCEDURE

#### 4.1 EXAMINATION OF CONTAINER FOR DAMAGE AND LABELLING

##### 4.1.1 Scope

- 4.1.1.1 This section describes the procedure for determining whether the product container is clearly identified<sup>1</sup>.


##### 4.1.2 Apparatus

- 4.1.2.1 A graduated measuring magnifier or equivalent with a resolution of 0.1 mm or better.

##### 4.1.3 Procedure

- 4.1.3.1 Examine the product container for damage. If there is damage, assess the extent of the damage, discuss with supervisor (and/or with client if necessary) whether to continue or discontinue testing.
- 4.1.3.2 Examine the product container for the following information, which must be in either official language:
  - (i) the name and principal place of business in Canada of the importer or of the person by or for whom the product is made;
  - (ii) the model name or model number of the product; and
  - (iii) the year and month of manufacture of the product.

<sup>1</sup> § 4(2) and thus 4(1) (a) to (c) of the Regulations

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4.1.3.3 Measure the height of the characters used to present the information required in step 4.1.3.2. When lower case print is used, the size of the type is determined by measuring the height of the lower case "l" or similar full height letter.

#### 4.1.4 Results

4.1.4.1 Record details of the following:

- (i) Whether the product container was damaged and, if so, whether the contents were damaged;
- (ii) Whether the information listed in step 4.1.3.2 was present, and any discrepancies;
- (iii) The height of characters less than 2.5 mm.

## 4.2 EXAMINATION OF THE PRODUCT FOR DAMAGE AND LABELLING

### 4.2.1 Scope

4.2.1.1 This section describes the procedure for determining whether the information required to be printed on the product or affixed to it is clearly identified<sup>2</sup> and of the required size.

### 4.2.2 Apparatus

4.2.2.1 A graduated measuring magnifier or equivalent with a resolution of 0.1 mm or better.


### 4.2.3 Procedure

4.2.3.1 Examine the product for damage. If there is damage, assess the extent of the damage, discuss with supervisor (and/or with client if necessary) whether to continue or discontinue testing.

4.2.3.2 Examine the product for the presence of the following information, which must be clearly identified and displayed, in either official language:

- (i) The name and principal place of business in Canada of the importer or of the person by or for whom the product is made;
- (ii) The model name or model number of the product; and

<sup>2</sup> § 4(2) and thus 4(1) (a) to (c) of the Regulations

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(iii) The year and month of manufacture of the product.

4.2.3.3 Measure the height of the characters used to present the information required in step 4.2.3.2. When lower case print is used, the size of the type is determined by measuring the height of the lower case "l" or similar full height letter.

#### 4.2.4 Results

4.2.4.1 Record the following:

- (i) Whether the product was damaged and the extent of the damage (minor, moderate, severe, etc.);
- (ii) Whether the information listed in step 4.2.3.2 was present, and any discrepancies;
- (iii) The height of characters less than 2.5 mm.

### 4.3 REFERENCE TO THE *HAZARDOUS PRODUCTS ACT* OR THE *CRIBS AND CRADLES REGULATIONS*

4.3.1 Ensure that no references, direct or indirect, to the *Hazardous Products Act* or these Regulations are made in any written material applied to or accompanying the product or in any advertisement of the product. Note any discrepancies.

### 4.4 WARNING STATEMENTS

#### 4.4.1 Scope

4.4.1.1 This section describes the procedure for determining whether the required warning notices are on the product<sup>3</sup>.

#### 4.4.2 Apparatus


4.4.2.1 A graduated measuring magnifier or equivalent with a resolution of 0.1 mm or better.

#### 4.4.3 Procedure

4.4.3.1 Examine the product for the following information:

- (i) as per section 4 (3) of the Regulations for cribs;
- (ii) as per section 4 (4) of the Regulations for cradles;

<sup>3</sup>§ 4(3) to 4(7) of the Regulations

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- (iii) as per section 4 (5) of the Regulations for both cribs and cradles;
- (iv) as per section 4 (6) of the Regulations for both cribs and cradles; and
- (v) as per section 4 (7) of the Regulations for cribs.

#### 4.4.4 Results

4.4.4.1 Record whether the required information listed in section 4.4.3.1 is present. Include a photograph of the text to show any discrepancies.

### 4.5 PERMANENCY OF THE LABELS AND POUCH

#### 4.5.1 Scope

4.5.1.1 This section describes the procedure for determining whether the product's and container's labels and the product's pouch are permanently attached<sup>4</sup>.

#### 4.5.2 Apparatus

4.5.2.1 A nylon scrub pad.

4.5.2.2 A force gauge that measures up to 90 N, with a resolution of 1 N or better.

4.5.2.3 A pair of wide-jaw vise-grip pliers (see Figure 1).

4.5.2.4 A knife or scalpel.

4.5.2.5 A stopwatch with a resolution of 0.1 seconds or better.


#### 4.5.3 Procedure

4.5.3.1 Dry scrub 10 times (10 back and forth strokes) with a nylon scrub pad, the labels which are affixed to the product and container in a manner and direction most likely to cause the edges of the label to lift.

4.5.3.2 Using a fingernail, knife or scalpel, attempt to raise a portion of the label (a corner is preferred, if available) far enough so that the label clamp can be attached. Care should be taken not to damage the label material or surface on which it is affixed.

4.5.3.3 Attach the label clamp (such as a pair of wide-jaw vise-grip pliers) to the raised portion of the label at a point that has not been damaged (torn, frayed, etc.) by the raising action.

<sup>4</sup> § 4(1) to 4(7) of the Regulations

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4.5.3.4 Attach the force gauge to the wide-jaw vise-grip pliers (see Figure 1) and gradually apply a force up to but not exceeding 90 N (85 N  $\pm$  5 N) in an attempt to initiate and sustain removal action of the label. The angle of force application (as close as possible to the horizontal is preferred) may be adjusted to facilitate removal of the label. If the attached portion of the label slips from the clamp, adjust the clamp, re-attach it and the force gauge and resume the test. If the label begins to tear, continue with the test until the torn portion detaches or until the entire label has been completely detached.

4.5.3.5 In the case of a pouch, attach a clamp to it and apply a force up to but not exceeding 90 N (85 N  $\pm$  5 N). The angle of force application (as close as possible to the horizontal is preferred) may be adjusted to facilitate removal of the pouch. Hold the force for 10 seconds (10 s  $\pm$  1 s), on any pouch, plastic, or other material bearing or containing printed or stamped information, warning statements or instructions.

#### 4.5.4 Results

4.5.4.1 Record the following:


- (i) The location of the label or pouch;
- (ii) If a portion of the label or pouch could not be raised a sufficient amount to provide an adequate undamaged area to attach the label clamp;
- (iii) Whether the label or pouch detached completely from the product;
- (iv) The maximum force applied;
- (v) Whether the label or pouch tore or was damaged during the attempt to remove it from the product;
- (vi) Whether the surface on which the label or pouch was affixed was damaged during the attempt to remove it from the product.

## 4.6 INDELIBILITY OF THE PRINTING

### 4.6.1 Scope

4.6.1.1 This section describes the procedure for determining whether the written information supplied on the product container and with the product is indelible<sup>5</sup>.

<sup>5</sup>§ 4(1) to 4(5) and 4(7) of the Regulations

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#### 4.6.2 Apparatus

4.6.2.1 A non-abrasive, non-corrosive household window cleaner used as recommended by its manufacturer.

4.6.2.2 An all-purpose cloth.

#### 4.6.3 Procedure

4.6.3.1 Any information, warning statement or instruction which is either:

- (i) printed on a label which is glued onto the product/container; or
- (ii) printed on plastic or other material affixed to the product/container; or
- (iii) stamped or printed on the product/container,

is rubbed 10 times (10 back and forth strokes) with an all-purpose cloth to which has been applied a non-abrasive, non-corrosive household window cleaner.

#### 4.6.4 Results

4.6.4.1 Record whether any portion of the lettering was smudged or erased.

### 4.7 ASSEMBLY OF THE CRIB OR CRADLE IN ACCORDANCE WITH THE INSTRUCTIONS SUPPLIED

#### 4.7.1 Scope

4.7.1.1 This section describes the procedure for determining whether the product can be assembled in accordance with the instructions supplied<sup>6</sup>.

#### 4.7.2 Apparatus

4.7.2.1 No special test apparatus is required, however, hand tools may be required to complete product assembly.


#### 4.7.3 Procedure

4.7.3.1 Assemble the crib or cradle according to the manufacturer's instructions. Note any deficiencies or ambiguities in the instructions.

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<sup>6</sup> § 4(5) of the Regulations



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4.7.3.2 Examine the instructions to see if they meet the following requirements:

- (i) They shall clearly state, in both official languages, with sketches, or line drawings or photographs illustrating the sequence of steps, the method of assembling the product;
- (ii) If the product is capable of being folded or unfolded, the instructions shall clearly indicate how to do so;
- (iii) If the mattress support height is adjustable, the instructions shall clearly indicate how to do it;
- (iv) A list of parts shall be included in the instructions;
- (v) The instructions shall contain a warning stating that parents or care givers should ensure a safe environment for the child by checking regularly, before placing the child in the product, that every component is properly and securely in place.

#### 4.7.4 Results

4.7.4.1 Record any deficiencies in the requirements outlined in step 4.7.3.2, as well as the location of the instructions.

### 4.8 MARKING OF PRODUCT FOR TESTING PURPOSES

#### 4.8.1 Scope

4.8.1.1 This section describes the procedure for identifying the corners and sides of the product.


#### 4.8.2 Apparatus

4.8.2.1 An indelible felt marker pen.

#### 4.8.3 Procedure

4.8.3.1 Facing the product with its headboard to the left and footboard to the right, mark the corners of both the crib and the mattress support as follows:

- (i) Corner 1 is the intersection of the far side and the footboard side;
- (ii) Corners 2, 3,4, and beyond follow, respectively, in a counterclockwise order.

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4.8.3.2 For products with no headboard, corners or other parts listed, devise an alternate marking scheme for the product such that mattress support points and other parts of the crib or cradle can be easily located or identified.

## 4.9 LATCHING AND LOCKING

### 4.9.1 Scope

4.9.1.1 This section describes the procedure for evaluating the latching and locking mechanisms on the product<sup>7</sup>.

### 4.9.2 Apparatus

4.9.2.1 A force gauge that measures up to 35.0 N with a resolution of 0.1 N or better.

4.9.2.2 A torque-meter that measures up to 0.80 N·m with a resolution of 0.01 N·m or better.

### 4.9.3 Procedure

4.9.3.1 For products with movable sides, verify whether the latching or locking mechanisms, holding the movable side closed meet the following requirements:

- (i) they shall require two separate and simultaneous actions on the part of the user to release the mechanism. If this is unclear or difficult to determine, photograph and document a reasonably foreseeable action that clearly illustrates the concern; and
- (ii) they shall engage automatically.


4.9.3.2 For products with move-away sides, check that every move-away side has at least two latching or locking mechanisms that meet the requirements of step 4.9.3.1 (i) and (ii) and that engage automatically where each latching or locking mechanism requires:

- (i) a force of greater than or equal to 35.0 N to disengage as a result of a pull or push force applied to the mechanism; or
- (ii) a torque of greater than or equal to 0.80 N·m to disengage as a result of a torque applied to the mechanism.

### 4.9.4 Results

4.9.4.1 Record the following:

<sup>7</sup> § 6(1) and 6(2) of the Regulations

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- (i) The results of step 4.9.3.1 for movable sides;
- (ii) The results of step 4.9.3.2 for move-away sides, including the force (if less than 35.0 N) or torque (if less than 0.80 N·m) required to disengage the latching or locking mechanism.

#### 4.10 SWING

##### 4.10.1 Scope

4.10.1.1 This section describes the procedure for measuring the swing of a cradle<sup>8</sup>.

##### 4.10.2 Apparatus

4.10.2.1 A protractor that measures an angle of up to 20.0° with a resolution of 0.1° or better.

##### 4.10.3 Procedure

4.10.3.1 If the cradle rocks or swings, measure the maximum angle of swing from the vertical.

##### 4.10.4 Results

4.10.4.1 Record the maximum degree of swing or rock measured.

#### 4.11 MATTRESS

##### 4.11.1 Scope

4.11.1.1 This section describes the procedure for checking the mattress size and the mattress stitching<sup>9</sup>.


##### 4.11.2 Apparatus

4.11.2.1 A measuring device with a resolution of 1 mm or better.

4.11.2.2 A knife with a sharp pointed blade.

<sup>8</sup> § 7 of the Regulations

<sup>9</sup> § 15 of the Regulations

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#### 4.11.3 Procedure

- 4.11.3.1 Measure the length, width and thickness of the mattress (taken from seam to seam and not including any piping or tape edge). The thickness measurement is taken at the centre of the lengthwise side.
- 4.11.3.2 Measure the interior length and width of the crib or cradle.
- 4.11.3.3 Cut the mattress stitching in several places and examine it.

#### 4.11.4 Results

- 4.11.4.1 Record the following:
- (i) the length, width and thickness of the mattress;
  - (ii) the interior dimensions, width and length, of the crib or cradle;
  - (iii) the difference between the width of the crib or cradle and the width of the mattress;
  - (iv) the difference between the length of the crib or cradle and the length of the mattress; and
  - (v) whether the mattress stitching was stitched with lockstitching (see Figure 7).

### 4.12 MATTRESS SUPPORT HEIGHTS


#### 4.12.1 Scope

- 4.12.1.1 This section describes the procedure for measuring the height of the crib side rails in relation to the mattress support<sup>10</sup>.

#### 4.12.2 Apparatus

- 4.12.2.1 A measuring device with a resolution of 1 mm or better.
- 4.12.2.2 A solid rectangular block, 60.0 mm ( $\pm 0.5$  mm) by 100.0 mm ( $\pm 0.5$  mm) by 100.0 mm ( $\pm 0.5$  mm).
- 4.12.2.3 A right triangular prism-shaped loading wedge (see Figure 2).

<sup>10</sup> § 8, 9 and 10 of the Regulations

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4.12.2.4 A mass, which when added to the mass of the loading wedge, will exert a force of up to, but not exceeding, 90 N (88N ± 2N).

4.12.3 Procedure

4.12.3.1 Place the mattress support in its lowest position.

4.12.3.2 Measure the distance between the upper surface of the mattress support and the upper surface of the lowest stationary side to determine if this distance is:

- (i) For a standard crib, not less than 660 mm;
- (ii) For a portable crib, not less than 560 mm.

4.12.3.3 Measure the distance between the upper surface of the mattress support and the upper surface of every movable or move-away side to determine if there is at least one adjustment position for each movable or move-away side that is:


- (i) For a standard crib, not less than 660 mm;
- (ii) For a portable crib, not less than 560 mm.

4.12.3.4 Verify whether every stationary side or movable side, in every adjustment position, has its lowest surface below the upper surface of the mattress support. If not, attempt to pass the solid rectangular block, in any orientation, through the gap created between these surfaces in a manner similar to that outlined in section 4.23 of this test method.


4.12.3.5 Verify whether every move-away side, when in a position that complies with step 4.12.3.3, has its lowest surface below the upper surface of the mattress support. If not, attempt to pass the solid rectangular block, in any orientation, through the gap created between these surfaces in a manner similar to that outlined in section 4.23 of this test method.

4.12.3.6 Verify whether the upper surface of every move-away side in every adjustment position has one adjustment position:

- (i) below the upper surface of the mattress support when the move-away side is in a moved-away position; and
- (ii) at least 150 mm below the adjustment position described in step 4.12.3.3

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- 4.12.3.7 For standard or portable cribs with a movable or move-away side, verify that any advertisement on the product, container or instructional literature that depicts a child in the crib communicates the following requirements:
- 4.12.3.7.1 The distance between the upper surface of the lowest side in the highest adjustment position of the lowest side and the upper surface of the mattress support must be:
- (i) for a standard crib, not less than 660 mm; and
  - (ii) for a portable crib, not less than 560 mm.
- 4.12.3.7.2
- (i) the lower surface of any side is not in an adjustment position that is higher than the upper surface of the mattress support; and
  - (ii) the sides are in the adjustment position designed to provide sleeping accommodation for an unattended child.
- 4.12.3.8 Place the mattress support in its highest position.
- 4.12.3.9 Measure the distance between the upper surface of the mattress support and the following, to ensure that it is not less than 230 mm for a standard crib or not less than 130 mm for a portable crib:
- (i) Upper surface of the lowest stationary side;
  - (ii) Upper surface of every movable side in its lowest adjustment position;
  - (iii) Upper surface of a move-away side when in the position stated in step 4.12.3.3; and
  - (iv) Upper surface of a move-away side when in the position stated in step 4.12.3.6 (ii).
- 4.12.3.10 For every move-away side that moves above the mattress support of the crib, verify whether the lowest surface of the move-away side, when raised one adjustment position above the mattress support, is at least 360 mm above the upper surface of the mattress support in its highest position.

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#### 4.12.4 Results

##### 4.12.4.1 Record the following:

- (i) The distance measured in step 4.12.3.2;
- (ii) The distance measured in step 4.12.3.3;
- (iii) The results from step 4.12.3.4;
- (iv) The results from step 4.12.3.5;
- (v) The results from and the distances measured in step 4.12.3.6;
- (vi) The presence or absence of any advertisement described in step 4.12.3.7;
- (vii) The distance and information communicated in step 4.12.3.7.1;
- (viii) The results from step 4.12.3.7.2;
- (ix) The distance measured in step 4.12.3.9 (i);
- (x) The distance measured in step 4.12.3.9 (ii);
- (xi) The distance measured in step 4.12.3.9 (iii);
- (xii) The distance measured in step 4.12.3.9 (iv);
- (xiii) The results from and the distance measured in step 4.12.3.10.

#### 4.13 CORNER POSTS

##### 4.13.1 Scope

4.13.1.1 This section describes the procedure for measuring the heights of the corner posts above the sides of a standard or portable crib<sup>11</sup>.


##### 4.13.2 Apparatus

4.13.2.1 A combination square.

4.13.2.2 A measuring device with a resolution of 1 mm or better.

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<sup>11</sup>§ 12 of the Regulations

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#### 4.13.3 Procedure

4.13.3.1 Measure the height of each corner post from the lowest point on the upper surface of the higher adjoining side, within 70 mm from the centre-line of the post (see Figure 6).

#### 4.13.4 Results

4.13.4.1 Record the distances measured in 4.13.3.1.

### 4.14 THREADED BOLT ENDS

#### 4.14.1 Scope

4.14.1.1 This section describes the procedure for determining that there are no exposed threaded bolt ends<sup>12</sup>.

#### 4.14.2 Apparatus

4.14.2.1 A measuring device with a resolution of 1 mm or better.

4.14.2.2 The largest anthropometrically sized infant dummy whose mass does not exceed the maximum capacity stated by the product manufacturer.

#### 4.14.3 Procedure

4.14.3.1 Examine the product's bolt ends that are accessible to the occupant (See Appendix III - Accessibility to an Occupant).

#### 4.14.4 Results

4.14.4.1 Record every bolt end that is accessible to the occupant of the product which is not protected by an acorn nut or other suitable device and record the distance from that point to the nearest accessible entry point, if that bolt end is outside of the product.

### 4.15 COIL SPRINGS


#### 4.15.1 Scope

4.15.1.1 This section describes the procedure for determining that there are no coil springs that could cause injury<sup>13</sup>.

<sup>12</sup> § 20(4) of the Regulations

<sup>13</sup> § 22 of the Regulations



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#### 4.15.2 Apparatus

- 4.15.2.1 A measuring device with a resolution of 1 mm or better.
- 4.15.2.2 The largest anthropometrically sized infant dummy whose mass does not exceed the maximum capacity stated by the product manufacturer.

#### 4.15.3 Procedure

- 4.15.3.1 Examine the product's coil springs that are accessible to the occupant and do not form part of the mattress support (See Appendix III - Accessibility to an Occupant).

#### 4.15.4 Results

- 4.15.4.1 Record every coil spring that is accessible to the occupant of the product which is not enclosed, covered or otherwise designed so that there are no sharp points, sharp edges, open holes, shearing hazards or pinching hazards. Refer to sections 4.18, 4.19, and 4.21 for individual procedures relating to these hazards.

### 4.16 90 N PUSH/PULL


#### 4.16.1 Scope

- 4.16.1.1 This section describes the procedure for determining that
- (i) every component of the product that could possibly fit in the Small Parts Cylinder (see Figure 3); and
  - (ii) every cap or similar item that protects the edges of metal tubing that is accessible to an occupant of the product shall be so fitted or affixed to the product that the component will not become detached when subjected to a force of 90 N applied in any direction<sup>14</sup>.

#### 4.16.2 Apparatus

- 4.16.2.1 A two-pronged clamp.
- 4.16.2.2 A pair of combination pliers.
- 4.16.2.3 A pair of long-nosed pliers.

<sup>14</sup> § 17 and Schedule IV of the Regulations. This requirement applies to those product components which are accessible to the occupant and those which are not.

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4.16.2.4 A Small Parts Cylinder (see Figure 3).

4.16.2.5 A force gauge that measures up to 90 N with a resolution of 1 N or better.

#### 4.16.3 Procedure

4.16.3.1 Attempt to remove all components described in step 4.16.1.1 with a force of 90 N (85 N  $\pm$  5 N) applied in any direction.

#### 4.16.4 Results

4.16.4.1 Record whether any component became detached with a force of 90 N or less.

4.16.4.2 Record the force required to detach any component and the location of the component(s).

### 4.17 SMALL COMPONENTS

4.17.1 Conduct this test as described in Test Method M00.1 *Test Procedures to Determine Mechanical Hazards –Small Components–* on any components that were detached during the test in section 4.16. Do not perform sections 5.2.1 and 5.2.2 of Test Method M00.1. These sections apply only to detached components of toys.

### 4.18 SHARP EDGES AND SHARP POINTS

4.18.1 Conduct these tests as described in Test Method M00.2 *Test Procedures to Determine the Mechanical Hazards –Sharp Edges–*, and Test Method M00.3 *Test Procedures to Determine the Mechanical Hazards –Sharp Points–*.

### 4.19 OPEN HOLES

#### 4.19.1 Scope


4.19.1.1 This section describes the procedure for determining whether any open hole, slot or cavity of any shape or form, may pose a finger entrapment hazard<sup>15</sup>.

#### 4.19.2 Apparatus

4.19.2.1 A 5.5 mm diameter ( $\pm$  0.1 mm) probe.

4.19.2.2 A 10.0 mm diameter ( $\pm$  0.1 mm) probe.

<sup>15</sup> § 21 of the Regulations.

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4.19.2.3 A measuring device with a resolution of 1 mm or better.

4.19.2.4 The largest anthropometrically sized infant dummy whose mass does not exceed the maximum capacity stated by the product manufacturer.

#### 4.19.3 Procedure

4.19.3.1 Examine the product for open holes, of any shape or form, in a metal, plastic, wooden or similar hard material component, that are accessible to an occupant of the product (See Appendix III - Accessibility to an Occupant).

4.19.3.2 If found, attempt to insert each of the probes into the hole.

#### 4.19.4 Results

4.19.4.1 Record the type and location of any hole which admitted the 5.5 mm diameter probe but which did not also admit the 10 mm diameter probe.

4.19.4.2 Record the depth and minor diameter of any circular hole, or the narrowest dimension of any non-circular opening which admitted the 5.5 mm diameter probe but not the 10 mm diameter probe.

### 4.20 ENTANGLEMENT

#### 4.20.1 Scope

4.20.1.1 This section describes the procedure for determining whether any projection, attachment or mechanism above the upper surface of the mattress support poses an entanglement hazard to an occupant of the product<sup>16</sup>.

#### 4.20.2 Apparatus

4.20.2.1 An entanglement tester (see Figure 4)


4.20.2.2 A force gauge that measures up to 90 N with a resolution of 1 N or better.

4.20.2.3 A stopwatch with a resolution of 0.1 seconds or better.

#### 4.20.3 Procedure

4.20.3.1 Attach the force gauge to the entanglement tester and attempt to loop and grip the tester around a protrusion that is above the upper surface of the

<sup>16</sup> § 13 of the Regulations

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mattress support in its lowest adjustment position. The entanglement tester shall be held at an angle of approximately 45° either above or below the horizontal and be pulled with a 90 N (85 N ± 5 N) force for 10 seconds (10 s ± 1 s).

4.20.3.2 Repeat the procedure for all other protrusions.

#### 4.20.4 Results

4.20.4.1 Record whether the entanglement tester became entangled on any part of the product and the duration of time it stayed entangled during the test.

4.20.4.2 Record the location and description of any part of the product on which the entanglement tester stayed entangled during the test.

### 4.21 SHEARING OR PINCHING

#### 4.21.1 Scope

4.21.1.1 This section describes the procedure for determining whether any component, pivot, hinge, lock or mechanism accessible to the occupant poses a shearing or pinching hazard<sup>17</sup>.

#### 4.21.2 Apparatus

4.21.2.1 A 3.0 mm (± 0.1 mm) diameter probe.

4.21.2.2 A 15.0 mm (± 0.1 mm) diameter probe.

4.21.2.3 A measuring device with a resolution of 1 mm or better.


4.21.2.4 The largest anthropometrically sized infant dummy whose mass does not exceed the maximum capacity stated by the product manufacturer.

#### 4.21.3 Procedure

4.21.3.1 Examine the product for occupant-accessible spaces at or near the intersections of components that move relative to one another (See Appendix III - Accessibility to an Occupant).

4.21.3.2 Attempt to insert the 3.0 mm diameter probe into the spaces between the moving components. If the 3.0 mm diameter probe can be inserted into the space, then attempt to insert the 15.0 mm diameter probe into this space.

<sup>17</sup> § 19 of the Regulations. Only those parts that are accessible to the occupant AND located on the inside of the product are subject to this test. Note: Coil springs which form a part of the mattress support are considered NOT to be accessible to the occupant.

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#### 4.21.4 Results

- 4.21.4.1 Record the locations of any space that allowed the 3.0 mm diameter probe to enter without allowing the 15.0 mm diameter probe to enter.
- 4.21.4.2 Record the depth of insertion within the spaces between the moving components.

### 4.22 SLAT SPACING

#### 4.22.1 Scope

- 4.22.1.1 This section describes the procedure for determining whether the openings between the components of a crib or cradle allow the passage of the solid rectangular block<sup>18</sup> representing a child's torso.


#### 4.22.2 Apparatus

- 4.22.2.1 A solid rectangular block, 60.0 mm ( $\pm 0.5$  mm) by 100.0 mm ( $\pm 0.5$  mm) by 100.0 mm ( $\pm 0.5$  mm).
- 4.22.2.2 A right triangular prism-shaped loading wedge (see Figure 2).
- 4.22.2.3 A mass, which, when added to the mass of the loading wedge, will exert a force of up to, but not exceeding, 90 N (88N  $\pm$  2N).
- 4.22.2.4 A stopwatch with a resolution of 0.1 seconds or better.
- 4.22.2.5 A measuring device with a resolution of 1 mm or better.

#### 4.22.3 Procedure

- 4.22.3.1 Place the mattress support in its lowest adjustment position.
- 4.22.3.2 With the side or end of the crib under test placed in a horizontal position, place the loading wedge in the space between the slat, (bar, rail, spindle, crib rod, corner post or other similar component) of the crib or cradle and any adjacent component of the product, midway along the greatest dimension of the space.
- 4.22.3.3 Hang the mass onto the wedge for a period of 10 seconds (10 s  $\pm$  1 s).

<sup>18</sup> § 11 of the Regulations

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4.22.3.4 Attempt to pass the solid rectangular test block freely through the space without forcing it, anywhere on either side of the loading wedge.

4.22.3.5 Repeat steps 4.22.3.1 to 4.22.3.4 for all other spacings between slats on that side and, then, for all other spacings on sides which have slats.

#### 4.22.4 Results

4.22.4.1 Record the location of and describe any space on the product that allowed the test block to freely pass through it entirely.

### 4.23 120 N ALTERNATING HORIZONTAL FORCE

#### 4.23.1 Scope

4.23.1.1 This section describes the procedure for determining whether a standard crib is damaged from the application of an alternating horizontal force of 120 N to its sides<sup>19</sup>.

#### 4.23.2 Apparatus

4.23.2.1 Alternating horizontal force (shaking) equipment (Refer to *Standard Operating Procedure for the Crib Shaking Device*).

4.23.2.2 A selection of clamps.

4.23.2.3 **A measuring device with a resolution of 1 mm or better.**

#### 4.23.3 Procedure


4.23.3.1 Ensure that the linear motor thrust rod of the horizontal shaking equipment is in the approximate middle of its stroke.

4.23.3.2 Position the middle of side 1-2 of the standard crib under the clamp attached to the end of the thrust rod of the horizontal shaking equipment.

4.23.3.3 Clamp the legs of the standard crib to the frame of the horizontal shaking equipment (the castors of the product being tested may be removed) and adjust the sides of the product to the fully raised position.

4.23.3.4 Fasten the clamp of the horizontally positioned thrust rod to the middle of the top rail of the side to be tested not more than 50 mm from the top of the side being tested.

<sup>19</sup> § 16 and Schedule III § 3 of the Regulations

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4.23.3.5 Apply an alternating horizontal load of 120 N (110 N ± 10 N) at a frequency of no less than 150 cycles per minute (155 cycles per minute ± 5 cycles per minute) for a total of 9,000 cycles<sup>20</sup>.

4.23.3.6 Repeat steps 4.23.3.1 to 4.23.3.5 for all other sides of the product.

#### 4.23.4 Results

4.23.4.1 Record the following:

- (i) Whether the castors needed to be removed or not;
- (ii) Whether the crib displayed any sign of damage;
- (iii) Whether any screw or other fastener on the product became loose;
- (iv) Whether any latching or locking mechanism disengaged or deformed and whether each mechanism is still functional<sup>21</sup>.

### 4.24 120 N ALTERNATING VERTICAL FORCE

#### 4.24.1 Scope

4.24.1.1 This section describes the procedure for determining whether a standard crib is damaged from the application of an alternating vertical force of 120 N to its sides<sup>22</sup>.

#### 4.24.2 Apparatus

4.24.2.1 Alternating vertical force (shaking) equipment (Refer to *Standard Operating Procedure for the Crib Shaking Device*).

4.24.2.2 A selection of clamps.

4.24.2.3 A measuring device with a resolution of 1 mm or better.


#### 4.24.3 Procedure

4.24.3.1 Ensure that the linear motor thrust rod of the cylinder of the vertical shaking equipment is in the approximate middle of its stroke.

<sup>20</sup>A cycle shall consist of a 120 N push and a 120 N pull

<sup>21</sup>Refer to section 4.9.3 of this Test Method.

<sup>22</sup>§ 16 and Schedule III § 4 of the Regulations

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4.24.3.2 Position the middle of side 1-2 of the standard crib under the clamp attached to the end of the thrust rod of the cylinder of the vertical shaking equipment.

4.24.3.3 Clamp the legs of the standard crib to the frame of the vertical shaking equipment (the castors of the product being tested may be removed) and adjust the sides of the product to the fully raised position.

4.24.3.4 Fasten the clamp of the vertically positioned thrust rod to the middle of the top rail of the side to be tested not more than 50 mm from the top of the side being tested.

4.24.3.5 Apply an alternating vertical load of 120 N (110 N ± 10 N) at a frequency of no less than 150 cycles per minute (155 cycles per minute ± 5 cycles per minute) for a total of 9,000 cycles<sup>23</sup>.

4.24.3.6 Repeat steps 4.24.3.1 to 4.24.3.5 for all other sides of the product.

#### 4.24.4 Results

4.24.4.1 Record the following:

- (i) Whether the castors needed to be removed or not;
- (ii) Whether the crib displayed any sign of damage;
- (iii) Whether any screw or other fastener on the product became loose;
- (iv) Whether any latching or locking mechanism disengaged or deformed and whether each mechanism is still functional<sup>24</sup>.

### 4.25 250 N INDIVIDUAL UPWARD FORCE (Backloading)

#### 4.25.1 Scope


4.25.1.1 This section describes the procedure for determining whether the mattress support dislodges or the mattress support mechanisms deform or disengage when an individual upward force is applied at each corner of the mattress support<sup>25</sup> or in the absence of corners, at each of its mattress support mechanisms.

<sup>23</sup>A cycle shall consist of a 120 N push and a 120 N pull

<sup>24</sup>Refer to section 4.9.3 of this Test Method.

<sup>25</sup>§ 5 and Schedule I of the Regulations




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#### 4.25.2 Apparatus

- 4.25.2.1 A loading device that applies and maintains a 250 N force.
- 4.25.2.2 A measuring device with a resolution of 1 mm or better.
- 4.25.2.3 A selection of clamps.
- 4.25.2.4 A level or protractor.
- 4.25.2.5 A stopwatch with a resolution of 0.1 seconds or better, or a built-in timing device activating the 250 N force.

#### 4.25.3 Procedure

- 4.25.3.1 Ensure that the product is assembled according to the manufacturer's recommended instructions.
- 4.25.3.2 Apply a downward force of 25 N ( $23\text{ N} \pm 2\text{ N}$ ) as near as possible to the geometric centre of the mattress support as a means of settling to its intended position prior to testing.
- 4.25.3.3 Secure the product on a horizontal test plane.
- 4.25.3.4 Place the loading device under the mattress support of the crib or cradle at corner 1 of the mattress support and within 150 mm of each of the two sides forming the interior corner of the product's frame.
- 4.25.3.5 Measure and record the vertical position of each corner of the mattress support relative to a fixed component of the product. It is suggested that the top rail of a side be used so that the effective side height requirement can be monitored, should movement of the mattress support occur.
- 4.25.3.6 Apply and maintain an upward force of 250 N ( $225\text{ N} \pm 25\text{ N}$ ) for 60 seconds ( $60\text{ s} \pm 1\text{ s}$ ), at corner 1 of the mattress support. If the mattress support displaces upward to the maximum functional range of the loading device, stop the test, re-position the loading device in a manner that will allow further upward movement of the mattress support until the full 250 N ( $225\text{ N} \pm 25\text{ N}$ ) is reached and re-start the test.
- 4.25.3.7 If displacement of the mattress support from its original intended position occurs, apply a force of 25 N ( $23\text{ N} \pm 2\text{ N}$ ) as near as possible to the geometric centre of the mattress support in an attempt to return the mattress support to its original intended position.

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4.25.3.8 Measure and record the location of each corner of the mattress support relative to the same fixed component used in step 4.25.3.5.

4.25.3.9 If displacement of the mattress support occurs, and it does not return to its original intended position upon application of a 25 N (23 N ± 2 N) force,


- (i) attempt to adjust the mattress support so that it is once again level with the horizontal test plane or in the manufacturer's original intended position;
- (ii) terminate individual back loading testing if the mattress support cannot be returned to a position horizontal to the test plane or to the manufacturer's original intended position without subjecting the product to damage.

4.25.3.10 Repeat steps 4.25.3.2 to 4.25.3.9 all other corners of the mattress support.

#### 4.25.4 Results

4.25.4.1 Record the following:

- (i) Whether the mattress support dislodged and returned to its original intended use position under its own weight or under the 25 N external force.
- (ii) The distance of dislodgement of the mattress support if it did not return to its original intended position upon application of the 25 N force;
- (iii) Whether any portion of the mattress support deformed from its original shape and the measured deformation;
- (iv) Whether any portion of the mattress support projected below the bottom edge of any side of the product and the measured projection below the bottom edge of the product;
- (v) Whether any mattress support mechanism partially or fully disengaged, from the mattress support or from the frame of the product, and whether the mechanisms are still functional.

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#### 4.26 250 N SIMULTANEOUS UPWARD FORCES (Backloading)

##### 4.26.1 Scope

4.26.1.1 This section describes the procedure for determining whether the mattress support dislodges or the mattress support mechanisms deform or disengage when simultaneous upward forces are applied at each corner of the mattress support,<sup>26</sup> or in the absence of corners, at each of its mattress support mechanisms.

##### 4.26.2 Apparatus

4.26.2.1 Four or more loading devices that each apply and maintain a 250 N force.

4.26.2.2 A measuring device with a resolution of 1 mm or better.

4.26.2.3 A selection of clamps.

4.26.2.4 A level or protractor.

4.26.2.5 A stopwatch with a resolution of 0.1 seconds or better, or a built-in timing device activating the simultaneous 250 N forces.

##### 4.26.3 Procedure

4.26.3.1 Ensure that the product is assembled according to the manufacturer's recommended instructions.


4.26.3.2 Apply a downward force of 25 N (23 N ± 2 N) as near as possible to the geometric centre of the mattress support as a means of settling to its intended position prior to testing.

4.26.3.3 Secure the product on a horizontal test plane.

4.26.3.4 Place a loading device under the mattress support of the crib or cradle as close as possible to each corner of the mattress support.

4.26.3.5 Measure and record the vertical position of each corner of the mattress support relative to a fixed component of the product. It is suggested that the top rail of a side be used so that the effective side height requirement can be monitored, should movement of the mattress support occur.

<sup>26</sup> § 5 and Schedule I of the Regulations

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4.26.3.6 Apply and maintain simultaneous upward forces of 250 N ( $225\text{ N} \pm 25\text{ N}$ ) for 60 seconds ( $60\text{ s} \pm 1\text{ s}$ ), as close as possible to each corner of the mattress support. If the mattress support displaces upward to the maximum functional range of any loading device, stop the test, re-position the loading device(s) in a manner that will allow further upward movement of the mattress support until the full 250 N ( $225\text{ N} \pm 25\text{ N}$ ) is reached and re-start the test.


4.26.3.7 If displacement of the mattress support from its original intended position occurs, apply a force of 25 N ( $23\text{ N} \pm 2\text{ N}$ ) as near as possible to the geometric centre of the mattress support in an attempt to return the mattress support to its original intended position.

4.26.3.8 Measure and record the location of each corner of the mattress support relative to the same fixed component used in step 4.26.3.5.

#### 4.26.4 Results

4.26.4.1 Record the following:

- (i) Whether the mattress support dislodged and returned to its original intended use position under its own weight or under the 25 N external force;
- (ii) The distance of dislodgement of the mattress support if it did not return to its original intended position upon application of the 25 N force;
- (iii) Whether any portion of the mattress support deformed from its original shape and the measured deformation;
- (iv) Whether any portion of the mattress support projected below the bottom edge of any side of the product and the measured projection below the bottom edge of the product;
- (v) Whether any mattress support mechanism partially or fully disengaged, from the mattress support or from the frame of the product, and whether the mechanisms are still functional.

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#### 4.27 200 N FORCE IN ANY DIRECTION

##### 4.27.1 Scope

4.27.1.1 This section describes the procedure for determining whether the product's mattress support mechanisms are damaged, disengaged or dislodged when subjected to a 200 N force applied in any direction<sup>27</sup>.

##### 4.27.2 Apparatus

4.27.2.1 A two-pronged clamp.

4.27.2.2 A pair of combination pliers.

4.27.2.3 A pair of long-nosed pliers.

4.27.2.4 A force gauge that measures up to 200 N with a resolution of 2 N or better.

##### 4.27.3 Procedure

4.27.3.1 Secure the product on a horizontal test plane.

4.27.3.2 Apply a 200 N (190 N ± 10 N) force directly onto one of the mattress support mechanisms in a manner that could disengage it. Repeat the application of this force in any direction and at any point on the mattress support mechanism in a manner that could cause a deformation of the mechanism or any component thereof. Ensure to apply the full 200 N force irrespective of any dislodgement or deformation that may occur prior to attaining the maximum 200 N value as long as the degree of dislodgement or deformation does not impede the test.


4.27.3.3 Repeat step 4.27.3.2 on the remaining mattress support mechanisms.

##### 4.27.4 Results

4.27.4.1 Record the following:

- (i) Whether the mattress support dislodged from its original intended position and the distance of the dislodgement;
- (ii) Whether the mattress support mechanism either partially or fully disengaged from the mattress support or from the frame of the crib;

<sup>27</sup> § 5 and Schedule I § 1(h) of the Regulations

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- (iii) Whether the mattress support mechanism deformed and the measured deformation and whether the mechanisms are still functional.

## 4.28 IMPACT

### 4.28.1 Scope

- 4.28.1.1 This section describes the procedure for determining whether a standard crib or a cradle will withstand repeated impacting<sup>28</sup>.

### 4.28.2 Apparatus

- 4.28.2.1 A free-fall impacting system machine.
- 4.28.2.2 A 20.0 kg (19.9 kg ± 0.1kg) impact mass for standard cribs (see Figure 5).
- 4.28.2.3 A 13.7 kg (13.6 kg ± 0.1 kg) impact mass with a square contact area of 929 cm<sup>2</sup> (± 10 cm<sup>2</sup>) for cradles.
- 4.28.2.4 A 150 mm (± 1 mm) long gauge.
- 4.28.2.5 A test mattress as described in Schedule III to the *Cribs and Cradles Regulations*.


### 4.28.3 Procedure

- 4.28.3.1 Adjust the mattress support to its lowest position.
- 4.28.3.2 Put the test mattress in place<sup>29</sup>.
- 4.28.3.3 Secure the product to the horizontal test plane with the castors still on (if supplied)<sup>30</sup>.
- 4.28.3.4 Position the geometric centre of the test mattress below the impact mass.

<sup>28</sup> § 16 and Schedule III § 1 of the Regulations for standard cribs and § 2 for cradles

<sup>29</sup> Do NOT use the mattress supplied with the crib or cradle. For products with built-in mattresses, use the test mattress also. The same test mattress may **not** be used for testing more than one crib.

<sup>30</sup> Once the test has begun, no attempt shall be made at retightening fasteners which may have loosened because of vibration. The test must proceed without any corrective intervention until its completion, unless extensive damage, dislodging or deformation occurs during the course of the test, in which case the test shall be terminated. The only exception will be resetting the test mattress, should it become displaced from its intended position.

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4.28.3.5 Adjust the distance between the top surface of the mattress and bottom surface of the impact mass to 150 mm when the impact mass is in its highest position<sup>31</sup>.

4.28.3.6 For a standard crib, allow the 20.0 kg impact mass to fall freely 150 times at the rate of one impact per second ( $\pm 10\%$  of the rate).

4.28.3.7 Repeat step 4.28.3.6 at each corner of the mattress support, with the centre of the impact mass 150 mm from the two sides forming the corners of the crib.

4.28.3.8 Repeat step 4.28.3.6 at the mid-point along the edge of the mattress support on all adjustable sides of the product, with the centre of the impact mass 150 mm from those sides.

4.28.3.9 For a cradle, allow the 13.7 kg impact mass to fall freely 500 times at the rate of one impact per second ( $\pm 10\%$  of the rate) only at the geometric centre of the product.

#### 4.28.4 Results

4.28.4.1 Record any signs of damage to the crib or cradle, any disengagement or deformation of any latching or locking mechanism or any loosening of any screw or fastening and whether the mechanisms are still functional.

### 4.29 8 N·m TORQUE

#### 4.29.1 Scope

4.29.1.1 This section describes the procedure for determining whether any slat of a standard or portable crib turns, disengages, permanently deforms or is damaged when subjected to an 8 N·m torque<sup>32</sup>.


#### 4.29.2 Apparatus

4.29.2.1 A torque-meter that measures up to 8.0 N·m with a resolution of 0.1 N·m or better.

4.29.2.2 A stopwatch with a resolution of 0.1 seconds or better.

<sup>31</sup>Lock the impactor mechanism at this height and DO NOT adjust the height during impacting. No attempt shall be made to adjust or reposition the mattress support mechanism during impacting.

<sup>32</sup>§ 18 and schedule V of the Regulations

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#### 4.29.3 Procedure

- 4.29.3.1 At a point midway along the length of each slat, apply a 8.0 N·m (7.5 N·m ± 0.5 N·m) torque for 10 seconds (10 s ± 1 s). If the slat's resistance to the applied torque weakens and the gauge's torque reading decreases, increase the torque such that 8.0 N·m (7.5 N·m ± 0.5 N·m) can be maintained. If movement of the torque gauge during increase is impeded, terminate the torque application and restart testing at the next slat.

#### 4.29.4 Results

- 4.29.4.1 Record the following:
- (i) Whether any slat turned<sup>33</sup> or rotated at the end attachment points, and the measured applied torque;
  - (ii) Whether any slat disengaged, deformed, permanently deflected, or showed any other signs of damage and give details of the damage;
  - (iii) Whether the mechanisms are still functional.

### 4.30 500 N PULL

#### 4.30.1 Scope

- 4.30.1.1 This section describes the procedure for determining whether the top and bottom rails of all crib sides that have slats are damaged by a 500 N pull force<sup>34</sup>.

#### 4.30.2 Apparatus

- 4.30.2.1 A pulling device that applies and maintains a 500 N force.
- 4.30.2.2 A selection of clamps.
- 4.30.2.3 A stopwatch with a resolution of 0.1 seconds or better, or a built-in timing device activating the 500 N force.


#### 4.30.3 Procedure

- 4.30.3.1 Position the cylinder of the 500 N pulling device directly above the middle of the top rail of the side which is to be tested.

<sup>33</sup> Turned means permanent rotational deflection of the slat, including where it attaches to the top and bottom rail

<sup>34</sup> § 18 and Schedule V of the Regulations



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4.30.3.2 Evenly secure the position of the bottom rail of the side to be tested to ensure symmetrical loading.

4.30.3.3 Secure the clamp of the 500 N pulling device to the middle of the top rail.

4.30.3.4 Apply and maintain for 30 seconds ( $30.0\text{ s} \pm 1.0\text{ s}$ ), an upward force of 500 N ( $480\text{ N} \pm 20\text{ N}$ ) on the top rail of the product.

4.30.3.5 Repeat steps 4.30.3.1 to 4.30.3.4 on all sides of the product which have slats.

#### 4.30.4 Results

4.30.4.1 Record whether there was any disengagement of the rails from the slats, the distance of disengagement and location of disengagement or any other damage to the product, as well as the method used to secure the bottom rail (4.30.3.2).

### 4.31 MESH OPENING SIZE

4.31.1 Conduct this test as described in Section 4.21, – *Determination of Mesh Opening Sizes*, as per Test Method M08: *Test Method for Playpens*.


## 5 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

5.1 Ensure that all measuring instruments are functional and are calibrated with traceability to national or international standards.

5.2 Testing and the results obtained according to this method include uncertainty associated with the following:

- (i) uncertainty of any or all calibrations by an accredited calibration laboratory of the apparatus stated and used in this method;
- (ii) standard uncertainty or standard deviation of a series of repeated measurements of masses or with instruments stated and used in this method (documented in the Equipment Record binder);
- (iii) a coverage factor ( $k = 1.96$ ) to express an expanded uncertainty ( $U = k u_c$ , where  $u_c$  is the combined standard uncertainty) for a level of confidence of approximately 95%, assuming normal distribution (Reference: General Guidelines for Evaluating and Expressing the Uncertainty of Accredited Laboratories' Measurement Results, CLAS Reference Document 5, May 1999).

5.3 The principal uncertainties associated with this method are due to:


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- (i) Variations in the application of the test procedure due to personnel conducting the test.
- (ii) Uncertainty associated with the measuring instruments.

## 6 TEST REPORT

6.1 The test report shall contain the following information:

- 6.1.1 A description of the product to include (where available) brand, style, country of origin, size, photo, UPC, and other pertinent information.
- 6.1.2 The number of sample elements tested.
- 6.1.3 The results of the tests (conducted in the sequence presented in section 4 of this test method) with specific details for any non-compliance or potential problems observed.
- 6.1.4 The Analyst's name and signature, as well as the name(s) and signature(s) of the reviewer(s).

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### Appendix I – Tools and Instruments

Figure 1: Wide-jaw vise-grip pliers

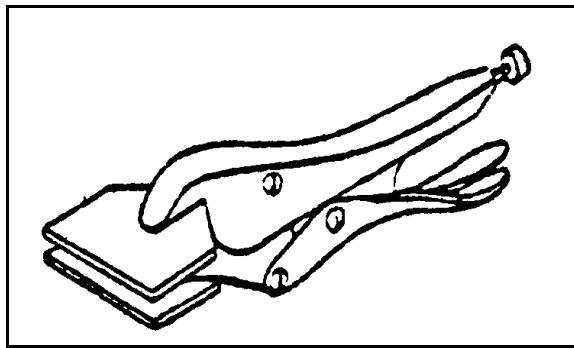
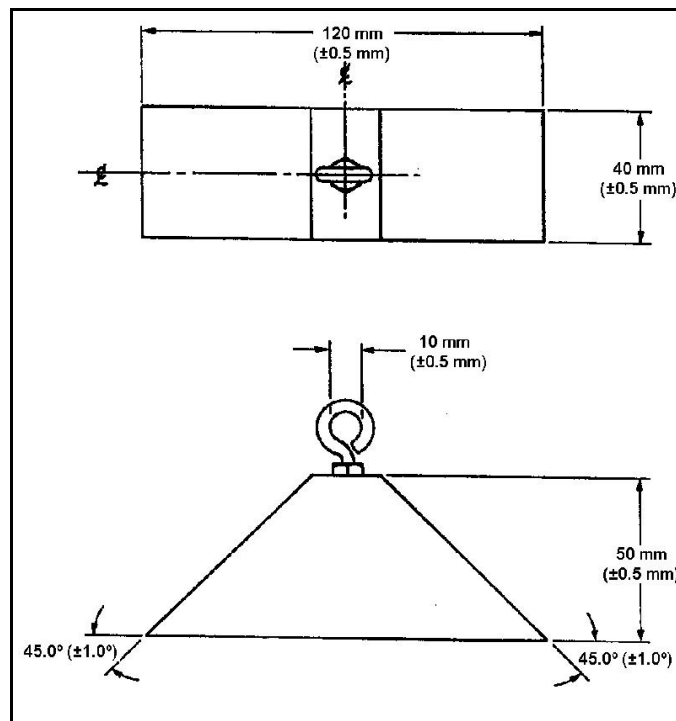


Figure 2: Wedge for slat testing.




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Figure 3: Small Parts Cylinder.

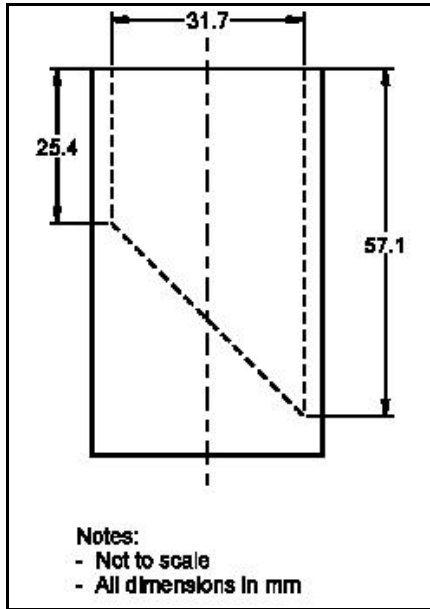
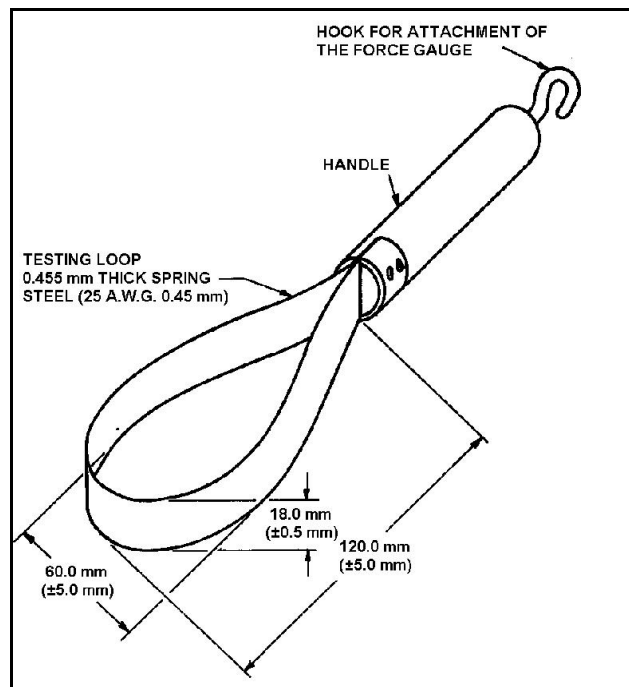


Figure 4: Entanglement Tester.




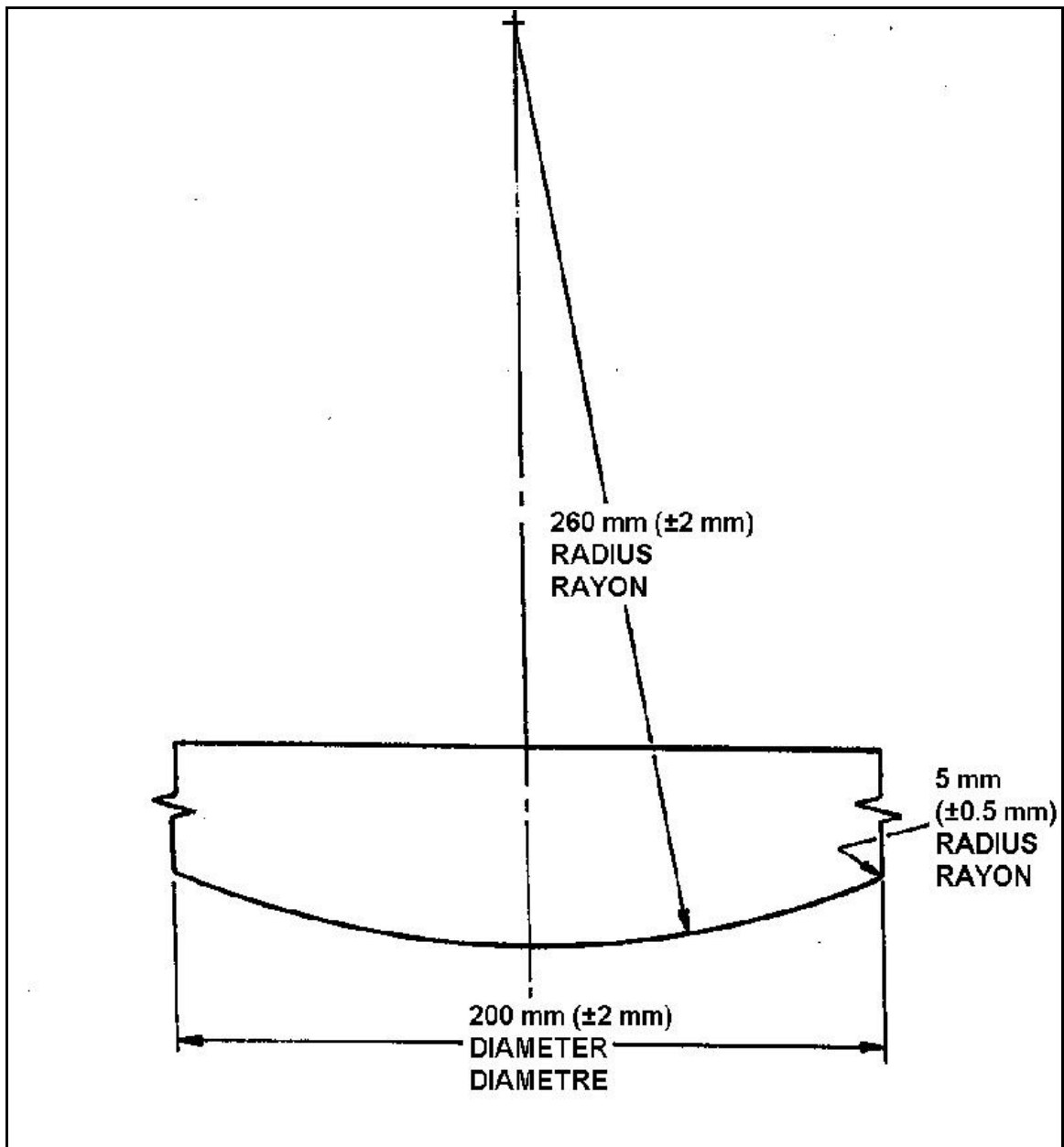

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Figure 5: Dimensions of the 20.0 kg impact mass.



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**Appendix II – Reference for the corner post height measurement and mattress stitching**

Figure 6: Protrusion of the corner post above the crib side panel within the 70 mm radius.

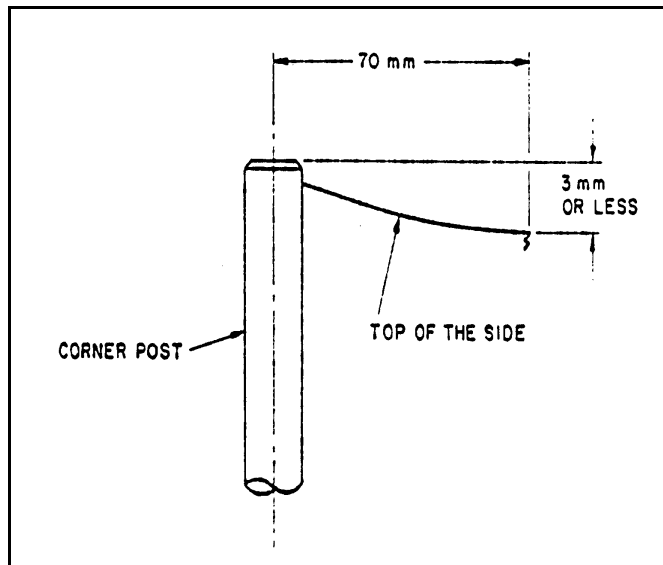
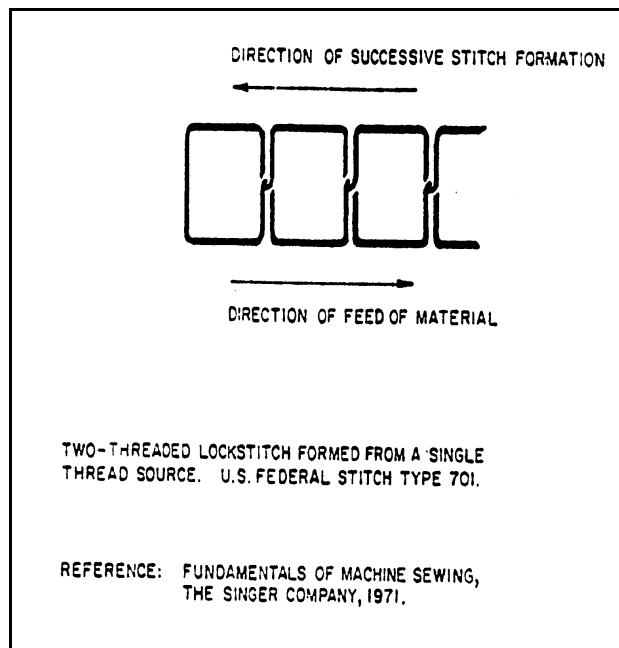



Figure 7: Lockstitching



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### Appendix III – Accessibility to an Occupant

#### Definition

Wherever used in the Engineering Test Methods developed and used by Health Canada's Product Safety Laboratory (PSL), the term "**accessible to an occupant**" is meant to describe all parts or components of or supplied with a product that are within the reach of any body part of a user. This applies to all use positions recommended by the product manufacturer. In the case of products such as strollers, carriages, cribs, and playpens, the occupant is an infant or a young child who may be sitting, standing or lying in the product.


#### Criteria Used

To determine the accessibility of potential hazards to an occupant of a product intended for children, the PSL uses CAMI Infant Dummies, Mark II. These are mannequins that were originally developed by the U.S. Department of Transportation for dynamic testing of crash restraint systems. They present some of the anthropometric characteristics of infants. Their dimensions are used by the PSL to determine whether hazardous locations on a product could be reached by an occupant. The PSL owns four CAMI Infant Dummies. The two smaller size dummies represent a 50<sup>th</sup> percentile male 6 month old infant, are 65 cm and 67 cm high, and weigh 7.75 kg and 7.95 kg, respectively. The two larger size dummies represent a 50<sup>th</sup> percentile male 18 month old infant, are 79 cm and 80 cm high, respectively, and both weigh 11.2 kg. (These values are summarised in Table 1).

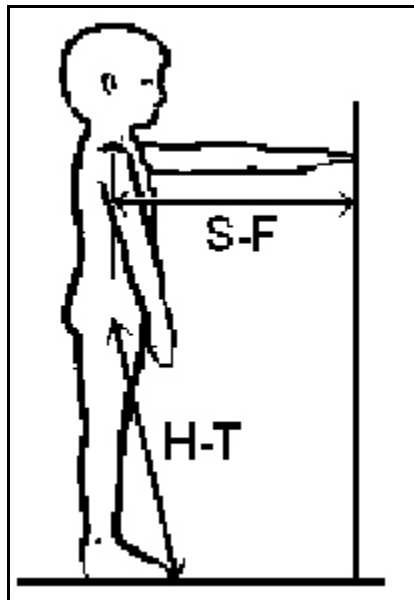
CAMI Infant Dummies are relatively rigid when compared with the natural flexibility of infants or children. For this reason, rather than using an actual limb member of the CAMI Infant Dummy to verify accessibility to an occupant, the PSL uses pieces of string of an appropriate length. The use of strings enables greater reach, assuming full segment flexibility and full joint mobility. Certain constraints apply, however. For the upper limb, shoulder mobility with respect to the thoracic cage (trunk) is not taken into account during the measurements. This leads to an underestimation of the maximum reach envelope when compared to a reach executed by a living subject in whom shoulder protraction, retraction, elevation and depression can take place. For the lower limb, ankle plantar flexion (pointing of the toes) is not taken into account which also leads to an underestimation when compared to the reach of a living subject.

A piece of string equal in length to the distance separating the CAMI Infant Dummy's shoulder and fingertip is used to estimate the accessibility of an occupant's arms, hands and fingers to potential hazards. (This distance is referred to as "S-F" in Figure 8 and presented in Table 1). Another piece of string, equal in length to the distance separating the CAMI Infant Dummy's hip and toes, is used to estimate the accessibility of an occupant's legs, feet and toes, to potential hazards. (This distance is referred to as "H-T" in Figure 8 and presented in Table 1).

In all cases, the CAMI Infant Dummy's position or orientation inside the product greatly affects what will be considered to be within the reach of the occupant. In the case of a stroller or a carriage, where the dummy is restricted to a specific seating or lying area, this position is relatively well defined. In the case of stability testing on an inclined plane, the dummy is secured in place with the product's restraint system. In the case of a crib or playpen where the occupant can be lying, sitting, standing or hunched over, this position can vary greatly. In cribs, specifically, coil springs that form part of the mattress support or posture board are not considered to be accessible to the occupant.

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**Figure 8.** Side view of the child model.



**Table 1.** Summary of the anthropometric characteristics of the four CAMI Infant Dummies used by the Product Safety Laboratory.

mannequin	total mass	standing height	shoulder-to-fingertip distance	hip-to toe distance
<b>50<sup>th</sup> percentile– 6 months old male</b>				
Dummy A (9475)	7.75 kg	65.0 cm	30.5 cm	26.2 cm
Dummy B (224085)	7.95 kg	67.0 cm	30.5 cm	26.2 cm
average	7.85 kg	66.0 cm	30.5 cm	26.2 cm
<b>50<sup>th</sup> percentile– 18 months old male</b>				
Dummy C (04413)	11.2 kg	79.0 cm	37.5 cm	33.3 cm
Dummy D (04414)	11.2 kg	80.0 cm	37.5 cm	33.3 cm
average	11.2 kg	79.5 cm	37.5 cm	33.3 cm



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### Measurement

- the Analyst chooses the PSL's largest CAMI Infant Dummy whose mass does not exceed the maximum capacity stated by the product manufacturer;
- the Analyst places the CAMI Infant Dummy in a position that allows for the shortest distance between the measurement points (for stroller testing, the dummy is placed in the product's seating area; for carriage testing, the dummy is placed in the centre of the occupants' area);
- one end of the string is held in place at a pre-determined marked location at the proximal joint (shoulder or hip); and
- the other end of the string is extended towards the area being examined; if the area being examined is within reach of the end of the string, it is considered to be accessible to an occupant.

..... END .....