LOG OF MEETING
DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: Meeting to Discuss a Test and Requirement for Fitted Crib Sheets

DATE OF MEETING: November 24, 1998 **PLACE**: Good Housekeeping Institute
New York, NY

LOG ENTRY SOURCE: John Preston, ES

COMMISSION ATTENDEES: John Preston, ES

NON-COMMISSION ATTENDEES:

Donald Mays, Good Housekeeping
Steven Zara, Good housekeeping
Lisa Benenson, Good Housekeeping
Mark Evanko, ACTS Testing Labs.

Bob Waller, JPMA
Kandi Mell, JPMA
Rick Locker, JPMA Counsel
Approximately 25 soft goods manufacturers.

SUMMARY OF MEETING:

The meeting was requested by Good Housekeeping Institute (GHI) to discuss a requirement and test to determine the adequacy of the fit of a fitted crib sheet on a crib mattress. Mr. Donald Mays, technical director of GHI, opened the meeting by describing the mission of the staff of GHI. He also noted some past accomplishments of GHI which included work in 1908 that assisted in standardizing kitchen counter height and their involvement in the late nineteen-sixties in developing tests and requirements for the safety of toys.

Mr. Mays said that CPSC incident data showed that there had been at least five strangulation deaths of infants in cribs due to their entanglement in fitted sheets that had partially detached from the mattress. He also said that there were reports of over 100 non-fatal entanglement/strangulation incidents associated with crib sheets. The intent of a procedure being proposed by GHI was to have it included in a forthcoming ASTM standard for infant bedding to prevent such deaths in the future.

Mr. Mays described tests that had been conducted by GHI staff on a variety of fitted crib sheets after they had been laundered in accordance with AATCC Test Method 150-1995. He said that flannel sheets displayed the greatest shrinkage during laundering and could reduce in size by as much as 11 inches (width + length).

Mr. Steven Zara demonstrated the GHI proposed test on a fitted crib sheet that had showed little shrinkage during laundering and one which had shrunk to the point at which it could barely be fitted onto a 6-inch thick crib mattress. He noted that the lowest force to detach a corner of the sheet from the mattress generally occurs at the corner that is the last to be attached.

A copy of the GHI proposed test method to evaluate the safety of fitted crib sheets is attached.

Attachment

Proposed Standard Test Method for Evaluating of the Safety of Fitted Crib Sheets (F15.19 Infant Bedding)

Prepared By Good Housekeeping
November 24, 1998

U.S. CONSUMER PRODUCT SAFETY COMMISSION

4330 EAST WEST HIGHWAY
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TO: **George Sushinsky** FAX NO. **301-413-7107**

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FROM: **John Preston**

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SUBJECT: Crib Sheet Test & Requirement

MESSAGE:
Attached is a proposed test and requirement for fitted crib sheets that was drafted by Good Housekeeping Institute. I think it needs some work! It will be a topic of discussion at the next meeting of the ASTM Infant Bedding Subcommittee that is scheduled for the week of 2/22/98. Any comments?

Standard Test Method for Evaluating of the Safety of Fitted Crib Sheets

Introduction

The US Consumer Products Safety Commission's records indicate that at least five deaths have been associated with crib sheets that came loose and either suffocated or strangled infants. Two additional fatalities, not previously reported to the CPSC, have recently been documented, as well as more than 100 "near misses" where infants became wrapped in their loose-fitting crib sheets. Although industry and Government safety standards cover cribs and crib mattresses, no safety standard currently exist for crib sheets.

At the Good Housekeeping Institute, 23 popular crib sheets representing 14 manufacturers were tested to see how easily they could be pulled free from a standard crib mattress. The tests showed a big gap in the performance from product to product in regard to how well they stayed in place. Many of the sheets were simply made too small to fully cover a crib mattress. Repeated washings and dryings resulted in significant dimensional changes in some models, exacerbating the fit problem.

While it is clear that crib sheets can be designed to significantly resist being pulled from a mattress, it is recognized that standardizing on the design of crib sheets would limit manufacturers' ability to differentiate themselves in the marketplace. Therefore, this method specifies performance rather than design criteria against which the safety of crib sheets can be measured. The intention of this standard is to significantly reduce if not totally eliminate the possibility of infant deaths caused by an item as unassuming as a crib sheet.

1. Scope

1.1 This test method applies to crib sheets that fit over a standard crib mattress.

1.2 This method provides a pass/fail test to determine the safety worthiness of a fitted sheet when used in a standard crib and mattress.

1.3 This test method evaluates the ability or non-ability of a crib sheet to stay fitted on the mattress regardless of any or all infant's attempts to pull on it.

1.4 This test method uses standard, readily available products. It employs a standard crib (having inner dimensions of 28 ± 5/8" by 52-3/8 ± 5/8" as per CFR 1508.3), a standard crib mattress (6" thick), a fitted mattress cover/pad, an apparatus used to simulate infant's weight (see 6.1 to 6.6), a force-gauge capable of reading tension forces in half–pound increments, a standard 1" C-clamp, and finally the sheet to be tested.

1.5 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1.6 The Omega electronic force gauge (Model #DFG51-50), the Chatillon mechanical force gauge (Type 719-20), and the Rubbermaid storage container (Model 3863) specified later in this standard, are covered by a patent or patents. Interested parties are invited to submit information regarding the identification of an alternative(s) to this patented item to the ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

1.7 The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

2. Referenced Documents

2.1 AATCC Test Method 150-1995 ***Dimensional Changes in Automatic Home Laundering of Garments.***

3. Significance and Use

3.1 The test procedure that is outlined here covers all crib sheets made to fit a "standard" crib mattress. It is also understood that a mattress cover for protection from getting wet shrouds mattresses used for this purpose. It is therefore necessary to test the performance of a sheet when it is fitted over a mattress with a mattress cover already in place.

3.2 These tests are designed to greatly reduce, if not eliminate altogether the dangers that exist with using some of today's fitted crib sheets. Our test procedure is designed with all the practical, everyday ways in which an infant-crib, mattress, mattress cover, and finally the sheet itself are used by the average consumer. We duplicated the infant's weight, position, and simulated to the best approximation the manner an infant might pull on a sheet.

4. Apparatus

The apparatus used in this test is comprised of the following:

4.1 One Rubbermaid Servi'Saver 2.2 Gallon container, with cover, part #3863

4.2 20 lbs. of sand

4.3 8 commonly available plastic food storage bags (see 5.1 to 5.6) and twist ties

4.4 One force gauge, Omega model #DFG51-50 (part #33180) or Chatillon Type 719-20. Gauge must be able to read tension forces to the nearest ½ lb.

4.5 One standard infant crib (inner dimensions of 28 ± 5/8" by 52-3/8 ± 5/8" as per CFR 1508.3)

4.6 One 6" thick standard crib mattress

4.7 One Kids Plus waterproof mattress cover

4.8 One 1" C-clamp

4.9 One scale capable of measuring up to 25 lbs. in increments of ½ lb.

5. Preparation of Apparatus

The simulated infant weight is to be prepared in the following manner:

5.1 Prepare the 8 plastic bags to be filled with sand. Bags are used to eliminate the possibility of sand spilling out, or sifting in the container.

5.2 Fill each bag with roughly 2.5 lbs. of sand.

5.3 Close four sandbags with twist ties and place at the bottom of the Rubbermaid container. Then place the other four open sandbags forming a second layer of bags.

5.4 Place the container with the eight sandbags, along with the cover, **and** four twist ties on the scale.

5.5 By removing or adding equal amounts of sand from/to each of the four top sandbags Adjust the total weight to 20 ± ½ lbs.

5.6 When the proper weight is achieved, close the four top sandbags using the twist ties, then secure the cover over the container.

6. Procedure

6.1 Wash the sheet using the AATCC Test Method 150-1995: Dimensional Changes in Automatic Home Laundering of Garments.

6.2 Fit mattress cover evenly over the mattress.

6.3 Fit either of the sheet's widths on one end of the mattress. This should be done in a manner that the two corner pockets are well fitted over the mattress/cover combination.

6.4 Fit the two pockets of the remaining width of the sheet over the other side of the mattress. Do not over- or under-stretch the sheet.

6.5 Feed one hand under one of the sheet's corners. Pinch about a ¼" of the sheet at the apex of the mattress corner. Using the 1-inch C-clamp, tighten the clamp onto the pinched material, then refit the sheet's corner over the mattress. ***In this step, be extra careful not to clamp the mattress cover and the sheet together. Only the sheet should be pinched and clamped.***

6.6 Without disturbing the fit of the sheet, gently lower the mattress into the crib.

6.7 Place the infant weight onto the mattress so that it is centered side-to-side (width-wise), and roughly a third of the way from the end being tested.

6.8 Gently hook the force gauge onto the C-clamp and pull vertically on the sheet's corner, being careful not to rub your hands or the force-gauge on any part of the crib sides. Keep pulling in a uniform speed, until the sheet's lowest edge clears the top of the mattress corner. It is not necessary to exceed 15 pounds of pull.

6.9 Unhook the instrument from the c-clamp, and read the peak force that was necessary to pull the sheet off the mattress.

6.10 Replace the sheet's corner over the mattress and mattress cover and return to the same fit as before the pull test. Leave the C-clamp hooked on the sheet's corner.

6.11 Testing the same corner, repeat steps 6.4 to 6.9, making sure that the direction of pull is in a 45° angle (side-to-side AND top-to-bottom) towards the inside of the crib.

6.12 Repeat steps 6.5 to 6.11 for the remaining corners of the sheet, obtaining two readings for each of the four corners of the sheet.

6.13 Record the eight tension readings in Table 1.

7. Calculation or Interpretation of Results

7.1 From the data in Table-1, find the lowest force (in lbs.) required to pull that corner of the sheet off the mattress. If this reading is equal to or greater than 10 lbs., then the sheet-under-test passes this test. If this reading is less than 10 lbs., then this sheet fails this test.

8. Precision and Bias

8.1 This test method provides certain performance criterions that determine whether a crib sheet passes or fails safety tests depending on the weakest test point. Other readings, even if higher than 10 lbs., have no bearing on the outcome of the test.

Table-1

Corner #	Vertical Pull	45° Pull
1		
2		
3		
4		

All entries in Table-1 are force readings in lbs.