



Ballot Vote Sheet

TO: The Commission
Alberta E. Mills, Secretary

THROUGH: Austin C. Schlick, General Counsel
Jason K. Levine, Executive Director

FROM: Daniel R. Vice, Assistant General Counsel, Regulatory Affairs
Mary A. House, Attorney, Regulatory Affairs

SUBJECT: ASTM's Notice of a Revised Voluntary Standard for Play Yards

DATE: February 15, 2023

BALLOT VOTE DUE: Wednesday, February 22, 2023

Section 104(b)(4)(B) of the Consumer Product Safety Improvement Act of 2008 (CPSIA) sets forth a procedure for updating mandatory standards that incorporate by reference, in whole or in part, a voluntary standard for a durable infant or toddler product. 15 U.S.C. § 2056a(b)(4)(B). This procedure applies to the Safety Standard for Play Yards, 16 CFR part 1221, which incorporates by reference ASTM F406-19, *Standard Consumer Safety Specification for Non-Full-Size Baby Cribs/Play Yards*, with modifications to exclude requirements that apply solely to non-full-size baby cribs. 84 *Fed. Reg.* 56,684 (Oct. 23, 2019).

On December 5, 2022, ASTM notified the Commission that it had approved and published a revised version of the voluntary standard for non-full-size baby cribs and play yards, ASTM F406-22. Under CPSIA section 104(b)(4)(B), revised voluntary standards that have been incorporated automatically are considered consumer product safety standards, unless the Commission determines and notifies the voluntary standards organization that the revised voluntary standard “does not improve the safety of the consumer product.” Based on CPSC staff’s assessment of the revised voluntary standard and public comments on the revised standard, staff recommends that the Commission determine that ASTM F406-22 does not improve the safety of play yards, and notify ASTM that CPSC is retaining the existing consumer product safety standard for play yards.

Please indicate your vote on the following options:

- I. Determine that ASTM F406-22 does not improve the safety of play yards and direct CPSC staff to notify ASTM of this determination and that the Commission is retaining the existing standard for play yards in 16 CFR part 1221.

(Signature)

(Date)

- II. Accept ASTM F406-22 as the new mandatory standard for play yards and direct staff to draft a *Federal Register* notice to revise the version of the voluntary standard incorporated by reference in 16 CFR part 1221, to be ASTM F406-22.

(Signature)

(Date)

- III. Take other action specified below.

(Signature)

(Date)

Attachment: February 15, 2023 Staff Briefing Package: ASTM's Notice of a Revised Voluntary Standard for Play Yards



Memorandum

Date: February 15, 2023

TO: The Commission
Alberta E. Mills, Secretary

THROUGH: Austin C. Schlick, General Counsel
Jason K. Levine, Executive Director
DeWane Ray, Deputy Executive Director for Safety Operations

FROM: Duane E. Boniface, Assistant Executive Director
Office of Hazard Identification and Reduction

Frederick DeGrano, Mechanical Engineer
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences

SUBJECT: ASTM's Notice of a Revised Voluntary Standard for Play Yards (16 CFR Part 1221)

I. Introduction/Background

On August 29, 2012, the U.S. Consumer Product Safety Commission (CPSC or Commission) published a final rule issuing a mandatory standard for play yards that incorporated by reference ASTM F406-12a, *Standard Consumer Safety Specification for Non-Full-Size Baby Cribs/Play Yards*, with modifications that exclude sections of ASTM F406-12a that apply to non-full-size cribs exclusively (77 *Fed. Reg.* 52,220 (Aug. 29, 2012)). The Commission promulgated this final rule under section 104 of the Consumer Product Safety Improvement Act (CPSIA) of 2008, and the rule is codified in 16 CFR part 1221, *Safety Standard for Play Yards* (the play yard standard). The mandatory play yard standard does not apply to non-full-size cribs (NFS) and therefore does not incorporate sections of ASTM F406 that only relate to NFS cribs.

Since the final rule for play yards was issued, ASTM has notified the Commission of two updates to the play yard standard, and both times the Commission issued a direct final rule to update the mandatory standard (with exclusions for requirements that apply to NFS cribs):

- On August 19, 2013, the Commission published a final rule to amend part 1221 to reflect incorporation by reference of ASTM F406-13 (78 *Fed. Reg.* 50,328).
- On October 23, 2019, the Commission published a direct final rule to update part 1221 to reflect incorporation by reference of ASTM F406-19 (84 *Fed. Reg.* 56,684).

On December 5, 2022, ASTM notified the Commission that it had approved and published another revised version of the voluntary standard, ASTM F406-22. On December 15, 2022, the Commission published in the *Federal Register* a Notice of Availability, requesting comment on whether the revision improves the safety of play yards (87 *Fed. Reg.* 76,614). The public comment period closed on December 29, 2022, and CPSC received eight comments.

The revised standard will take effect as the new mandatory standard on June 3, 2023, unless the Commission specifies a later date in the *Federal Register*, or notifies ASTM by March 5, 2023, that it has determined the revision does not improve the safety of play yards (see 15 U.S.C. 2056a(b)(4)(B)).

This memorandum outlines the differences between ASTM F406-19 and F406-22, specifically for sections that are applicable to play yards and the mandatory *Safety Standard for Play Yards*, and assesses the impact of the revised voluntary standard on the safety of play yards. Based on staff's evaluation, staff recommends that the Commission not allow ASTM F406-22 to be the new consumer product safety standard for play yards because it reduces safety.

II. Discussion

The following summarizes and discusses the changes included in the latest revision, ASTM F406-22, *Standard Consumer Safety Specification for Non-Full-Size Baby Cribs/Play Yards*. This version is an update to the previous version, ASTM F406-19, which is incorporated by reference with modification by CPSC's current mandatory *Safety Standard for Play Yards* in 16 CFR part 1221.

A. Substantive changes in ASTM F406-22

1. Mattress Thickness for Mesh/Fabric Play Yard Products

a. *Summary of ASTM F406-22 Revisions*

ASTM F406-22 adds a new requirement that allows mattresses up to 2 inches thick (section 5.16.2.2) and a new section that specifies a test method to measure the gap between the play yard mattress and sidewall (section 8.32).¹ Prior to this change, the requirement in ASTM F406-19 limited the overall thickness of play yard mattresses to no more than 1.5 inches thick, which includes a maximum of 1 inch of filling material such as foam, fiberfill, etc., and a maximum of 0.5 inches of structural members such as wood, hardboard, etc. The new requirement allows play yard mattresses up to a maximum of 2 inches of overall thickness with no specific limitation on the thickness of the filling material and structural members, thereby allowing mattresses with up to 2 inches of filling material, fabric layers, and vinyl layers and no structural members. For mattresses more than 1.5 inches thick, the update adds a requirement limiting the gap between the mattress perimeter and the mesh sidewall to no greater than 0.5 inches when the mattress

¹ Changes to mattress thickness in ASTM F406, if accepted, will also apply to after-market play yard mattresses in accordance with the mandatory *Safety Standard for Crib Mattresses*, 16 CFR Part 1241, which requires all after-market play yard mattresses to meet the following sections of the *Safety Standard for Play Yards*, 16 CFR part 1221: Stability; Cord/Strap Length; Mattress; Height of Sides; Floor Strength; Mattress Vertical Displacement.

is positioned in the manufacturer's recommended position in the center of the play yard. The update also adds a test method for measuring this gap using a sliding gauge to measure the horizontal distance between the mattress and the sidewall. The test method does not require application of a force, to simulate an infant's weight against the mesh sidewall, before measuring the gap.

b. Background on Play Yard Mattress Thickness

ASTM F406 specifies requirements for mattresses included with play yards (original equipment manufacturer play yard mattresses, or OEM play yard mattresses) to address entrapment incidents identified by CPSC, including limitations on mattress thickness and securing mattresses to the play yard floor. The ASTM F406 standard, originally adopted in 1981, required a maximum mattress thickness of 1 inch for play yards. ASTM added this requirement in response to asphyxiation deaths received by the CPSC in which the victims were sleeping in mesh-sided play yards and one of the sides was left unlocked, leading to a loose mesh sidewall.² In 1999, ASTM increased the maximum play yard mattress thickness to 1.5 inches, to accommodate structural members in the mattress pad, such as wood and hardboard. ASTM F406 does not include this type of limitation on mattress thickness for NFS baby cribs because the rigid sides prevent a gap that is limited to no more than 0.5 inches from expanding and becoming an entrapment hazard.

On January 13, 2022, ASTM balloted a proposal to increase OEM play yard mattress maximum thickness from 1.5 inches to 2 inches. CPSC staff voted negative and sent a letter³ (dated February 11, 2022) to the ASTM F15.18 Subcommittee on Play Yards and Non-Full-Size Cribs expressing staff's concerns that the proposal did not ensure a play yard's sidewall was stiff enough to prevent the formation of a hazardous pocket between the sidewall and mattress if the mattress is over 1.5 inches thick. Specifically, the balloted proposal did not require a force to be applied to the play yard's flexible sidewall to mimic an infant rolling into the side of the play yard. Therefore, staff determined the proposal did not address a flexible sidewall that will stretch and potentially form a hazardous pocket due to the weight of an infant against the sidewall. As discussed above, the 1.5-inch mattress thickness requirement was intended to minimize the depth of a pocket that can form between the mattress and mesh sidewalls.

Staff also concluded that the balloted proposed revision did not specify requirements for minimum tautness of mesh/fabric sides. Therefore, it is possible for products to meet the requirements of the balloted standard, yet still be designed with less taut mesh sidewalls to form hazardous gaps due to outward deflection with an applied force (such as an infant pushing against the sidewall). The balloted requirement to limit the gap between the mattress and sidewall to no more than 0.5 inches currently applies to baby cribs with rigid sides, but because play yards have flexible sides, a gap of 0.5 inches will expand when a lateral force is applied to

² United States, Consumer Product Safety Commission. "Regulation of Certain Mesh-sided Play Yards and Cribs Under Consumer Product Safety Act." 48 *Fed. Reg.* 34,018 (July 27, 1983).

³ <https://www.cpsc.gov/s3fs-public/220211-NFC-Play-yard-ballot-F15-22-01.pdf?VersionId=gjeDrEwJjNq3vevKCFziBdURk2C5yE1K>

the sidewall. On March 7, 2022, CPSC staff sent a follow-up letter⁴ to the ASTM subcommittee with staff's proposed test method to apply force to the play yard sidewall when measuring the gap between the mattress and sidewall, recommending that if a mattress is thicker than 1.5 inches, the gap between the mattress and sidewall must remain no more than 0.5 inches while this outward force is applied.

In an ASTM play yard subcommittee meeting on May 25, 2022, some members of the subcommittee opined that incident data show no hazard patterns with gaps less than 2 inches.⁵ The subcommittee and the F15 committee found staff's negative vote non-persuasive and voted to approve the requirements as balloted on August 9, 2022.⁶

Play yard mattresses can also be purchased separately from the play yard and are called after-market play yard mattresses. On February 15, 2022, the commission promulgated the final rule for crib mattresses, which is codified in 16 CFR part 1241, *Safety Standard for Crib Mattresses*, effective August 15, 2022. This final rule addresses hazards associated with after-market play yard mattresses by incorporating by reference the voluntary standard for crib mattresses, ASTM F2933-21, with modifications to make the standard more stringent. Requirements for after-market play yard mattresses have been included in ASTM F2933 since the 2018 version of the voluntary standard. Accordingly, the crib mattress final rule also regulates previously unregulated after-market play yard mattresses as required by section 104(a) of the CPSIA. The crib mattress rule defines an after-market mattress for play yards as "a mattress sold or distributed for a play yard," and further explains that the term "after-market" "does not include a replacement mattress provided or sold by an OEM if, and only if, it is equivalent with respect to dimensions, and specifications to the mattress that was provided with the original product." The crib mattress rule requires that all after-market play yard mattresses meet the same requirements as OEM play yard mattresses in ASTM F406, and also adds a test for mattress firmness that is not found in the ASTM F406 standard for OEM mattresses. These requirements are intended to address hazards associated with after-market mattresses, such as positional asphyxiation from ill-fitting after-market mattresses or suffocation from overly soft and thick after-market mattresses. Because the crib mattress rule states that after-market play yard mattresses must follow certain requirements for OEM play yard mattresses in ASTM F406, including requirements for mattress thickness, if the Commission modifies the requirements for OEM play yard mattresses in the mandatory standard for play yards, these requirements will also apply to after-market play yard mattresses.

⁴ <https://www.cpsc.gov/s3fs-public/CPSC-Proposed-Test-Method-for-F406-19-Revisions-Mar-7-2022.pdf?VersionId=JfL8XDdMdaOWlQjFi6E68Dm3X5HuxeQf>

⁵ <https://cpsc.gov/s3fs-public/2022-05-25%20%20ASTM%20F15.18%20Play%20Yard%20ASTM%20Subcommittee.pdf?VersionId=.9fhWAMSE5wYWEhw2eJSgfCEHRwJidaU>

⁶ ASTM voting rules states that all negative votes need to be accompanied by a written statement that explains the negative. The negative vote can be withdrawn by the voter after meeting discussion, can be found persuasive by the subcommittee which will withdraw the item from the ballot, or can be found non-persuasive and withdrawn by the subcommittee by two-thirds vote.

c. Play Yard Mattress-Related Incident Data

Staff conducted an incident data search to identify reports of injuries or fatalities involving gap entrapment between the mattress and sidewall for play yards occurring between January 1, 2010 and July 31, 2022. The data comprises incident reports obtained by the CPSC through the Consumer Product Safety Risk Management System (CPSRMS) and the National Electronic Injury Surveillance System (NEISS) databases.⁷ Staff identified 24 incidents resulting in fatalities and 61 nonfatal incidents. Staff reviewed each record to determine whether a report involved a fit issue associated with a mattress product being used in a play yard, including: a gap present or a wedge entrapment between a mattress and an end and/or side mesh wall of a play yard; a mattress moved or shifted in some way allowing contact or entrapment between the mattress and the mesh bottom of the play yard; or a fitted sheet or mattress cover, protector, or topper caused a mattress to bend, buckle, fold up, or create a gap between the mattress and an end and/or side wall of the play yard. Mattress or cushioning products not included in this data are: foam padding, homemade or makeshift mattresses, nursing pillows, sleep positioner products, and other bedding and pillow products.

Table 1 below summarizes the incident reports staff identified, and the appendix provides a summary of the 24 fatal incident reports. Of the 24 fatal incidents, 21 involved a fatality from gap entrapment where an infant was found wedged in a gap between a mattress and an end and/or side wall of the play yard, due to the mattress not fitting snugly in the play yard. These incidents include any body part such as head, shoulder, arm, or leg found wedged in a gap. In each of these incidents, staff identified the gap created by the mattress or mattresses in the play yard as a primary contributor to the circumstances leading to the fatality. The two fatal incidents involving OEM mattresses involve factors contributing to the incident other than the fit and thickness of the mattress.⁸ Fourteen of the nonfatal incident reports discuss either a gap present or a wedge entrapment of at least some body part between a mattress and an end and/or side mesh wall of the play yard. All incidents occurred before the crib mattress rule's effective date of August 15, 2022.

⁷ The CPSRMS database comprises anecdotal reports of incidents received by CPSC, such as "external cause"-based death certificates purchased by CPSC, in-depth investigations of these anecdotal reports, and investigations of select NEISS injuries. The NEISS databases is an injury surveillance and follow-back system containing data based on a nationally representative probability sample of participating hospitals in the United States.

⁸ IDI 150807CCC1815 states that the OEM mattress was not flush with the play yard floor. Staff advises that this may be due to the mattress not being secured to the play yard floor. IDI 170718CCC3096 involves a gap entrapment with the OEM mattress used in the hanging bassinet feature of the product.

Table 1. Reported fatal and nonfatal incidents related to gap entrapment involving a mattress product being used in a play yard: January 1, 2010–July 31, 2022

Role of Play Yard	Number of Reported Fatalities	Number of Reported Nonfatal Incidents
Wedged/Entrapment or Gap Present Between Mattress and End/Side Wall of Play Yard	21	14
<i>Original Equipment Manufacturer (OEM) Play Yard Mattress</i>	2	9
<i>After-Market Mattress</i>	13	5
<i>Unknown or Vague Description Account of the Mattress</i>	6	0
Mattress Shifted Allowing Contact or Entrapment with the Mesh Bottom of the Play Yard	3	39
<i>Child moved the mattress up and had at least some body part trapped under the mattress</i>	3	30
<i>Mattress will not lay flat</i>	0	9
Fitted Sheet or Mattress Cover/Protector/Topper Issue	0	8
Total	24	61

d. Child Anthropometry Related to Gap Entrapment

Based on staff's incident data analysis, fatal sidewall gap entrapment incidents have involved infants' arms, shoulders, torsos, faces, and heads being trapped, resulting in positional asphyxiation.⁹ While known fatal sidewall gap entrapment victims ranged from 1 month to 11 months in age, the majority of the victims were between 2 months and 6 months old. As explained in staff's 2017 response to Petition CP 15-2, *Petition Requesting Rulemaking on Supplemental Mattresses for Play Yards with Non-Rigid Sides*,¹⁰ these ages are particularly at risk for maneuvering into hazardous positions from which they cannot extricate themselves, such as sidewall gaps. The ASTM F15.18 subcommittee has worked on potential probes to test play yard sidewall gaps, estimating 3.66 inches as an infant's head breadth.¹¹ Staff agrees with this measurement, which represents the 5th percentile 0-to-3-month-old.¹²

⁹ Example IDI #s: 140702CCC3689, 190603HCC1480, and 181105HCC3067 are detailed in the appendix.

¹⁰ Commission Briefing Package: Petition CP 15-2 - Petition Requesting Ban on Supplemental Mattress for Play Yards with Non-Rigid Sides - May 10 2017_ with addendum: https://cpsc.gov/s3fs-public/Petition-CP-15-2-Petition-Requesting-Ban-on-Supplemental-Mattress-for-Play-Yards-with-Non-Rigid-Sides-May-10-2017_with-addendum.pdf?VersionId=A5jHAF103hZufDVuoRTKsfT9nu9dk4ly.

¹¹ For example, see staff meeting log for Meeting of the ASTM Play Yard Mattress Fit & Thickness Task Group Call that occurred on October 4, 2018: <https://cpsc.gov/s3fs-public/2018-10-04-ASTM-Play-Yard-Mattress-Fit-and-Firmness-Task-Group.pdf?VersionId=D2GZwqHuMKKiQsMLKHJiX9JOGkwSfwyW>.

¹² Source: Snyder, R. (1976). Physical characteristics of children as related to death and injury for consumer product safety design. *Applied Ergonomics*, 7(2), p.112 (<https://math.nist.gov/~Sressler/anthrokids/child.html#Head%20breadth>). Staff agrees with this measurement for head entrapment because head breadth (this would be an infant face down or face up in a gap) is a smaller dimension than head length, height, and circumference, and coupling this measurement with a younger age group incorporates a safety factor.

Incident reports¹³ do not reveal whether the known sidewall gap entrapment incidents causing death or injury have resulted from arm entrapment absent face or head entrapment. However, as staff has expressed in ASTM meetings,¹⁴ arm entrapments can lead to the infant being unable to move their face. Specifically, arm entrapment can lead to death or serious injury through positional asphyxiation when the infant's airway is occluded by the mattress or bedding, for instance if the infant is lying prone face down with their upper arm trapped in a sidewall gap and lacks the strength to raise or turn their head or free their arm. Arm entrapment could also increase the likelihood of face or head entrapment through wedging and gap expansion.

Staff concludes that the requirements in ASTM F406-22 allow for the creation of gaps sufficient to entrap an infant's arm. Based on the most recent Centers for Disease Control and Prevention (CDC) anthropometric reference data, the 10th percentile mid-upper arm diameter for male infants 2 months to 5 months of age is approximately 1.55 inches, and the 10th percentile mid-upper arm diameter for female infants 2 months to 5 months of age is approximately 1.5 inches.¹⁵ Therefore, staff assesses that an infant's arm can become trapped in a gap measuring greater than 1.5 inches wide and 1.5 inches deep, resulting in positional asphyxiation. This incident scenario is unlikely to occur with play yard mattresses and play yards compliant with the existing regulation (16 CFR part 1221) because it does not allow a sidewall pocket measuring both greater than 1.5 inches wide and 1.5 inches deep to form, due to the maximum mattress thickness of 1.5 inches.

Increasing the mattress thickness to 2 inches would create the potential for a deeper and wider gap. Staff's laboratory testing on play yard samples (see following section II.A.1.e) demonstrates that gaps between a mattress and a mesh sidewall can expand enough to fit a small infant's arm when a 5-pound force is applied to the sidewall. Figure 1 below demonstrates an example scenario where an infant is lying face down with an arm wedged in the mattress gap. The mattress gap with no force applied is initially 0.5 inches wide but can expand to fit a small infant's arm due to the flexible mesh sidewall. This position may prevent a small infant from extricating from this prone position and increasing the risk of positional asphyxia if the mattress is over 1.5 inches thick as shown in Figure 1.

¹³ For example, see summary of IDI 160812HCC2772 in the appendix.

¹⁴ Staff meeting log for Meeting of the ASTM Play Yard Mattress Fit & Thickness Task Group Call on October 4, 2018. See footnote 11.

¹⁵ Fryar, C.D., Carroll, M.D., Gu, Q., Afful, J., Ogden, C.L. (2021). Anthropometric reference data for children and adults: United States, 2015–2018. National Center for Health Statistics. Vital Health Stat 3(46). The CDC Anthropometric Reference is based on a nationally representative sample of the U.S. population, and the 2021 version is based on data collected from 2015 through 2018. According to this data, the 10th percentile mid-upper arm circumference for male infants 2 months to 5 months of age is 12.4 cm, and the 10th percentile mid-upper arm circumference for female infants 2 months to 5 months of age is 12 cm.

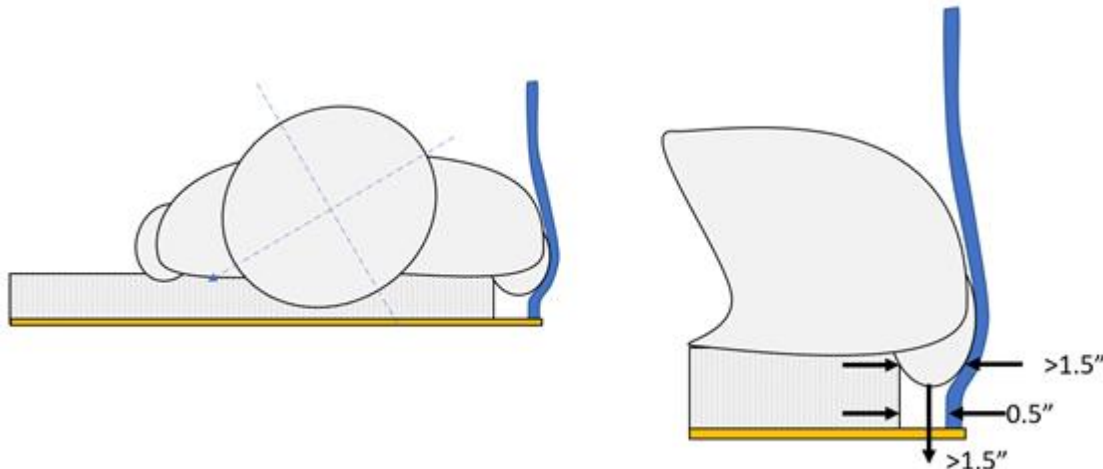


Figure 1. Example of Arm Entrapment in Expanded Mattress Gap Involving a Mattress Thicker than 1.5 inches

e. Laboratory Testing–Flexible Sidewalls

Because play yard sidewalls are constructed from pliable material, such as mesh or fabric, they will deflect with any force applied to the material. This can occur in play yards if an occupant rolls to the side of the sleep surface and leans his/her body onto the sidewall. This deflection may expand a gap between the mattress and the sidewall thus increasing the risk of entrapment and positional asphyxiation. Staff tested various play yard samples to evaluate the amount of outward deflection the mesh sidewalls will experience with an applied force. Using calculations for the side force generated by large 3-to-5-month-old infants leaning against the play yard's sidewall and empirical measurements generated by leaning a CRABI dummy¹⁶ against a vertical side, staff determined that 5 pounds is an appropriate lateral force to apply to the play yard side to determine the maximum gap measurement (see Figure 22 below). Staff's letter to the ASTM subcommittee, dated March 7, 2022, describes the above in more detail.¹⁷

¹⁶ The CRABI (Child Restraint Airbag Interaction) Child Anthropomorphic Test Devices (ATD) are commonly known as crash test dummies and were developed to evaluate child-restraint systems in automotive crash testing. In 1990, the Society of Automotive Engineers (SAE) Mechanical Human Simulation Subcommittee formed the Infant Dummy Task Group. The group developed design specifications for three sizes of infant dummies: a 6-month-old, 12-month-old, and 18-month-old. The group approved the weight distribution and scaling methods.

¹⁷ <https://www.cpsc.gov/s3fs-public/CPSC-Proposed-Test-Method-for-F406-19-Revisions-Mar-7-2022.pdf?VersionId=JfL8XDdMdaOWIQjFi6E68Dm3X5HuxeQf>

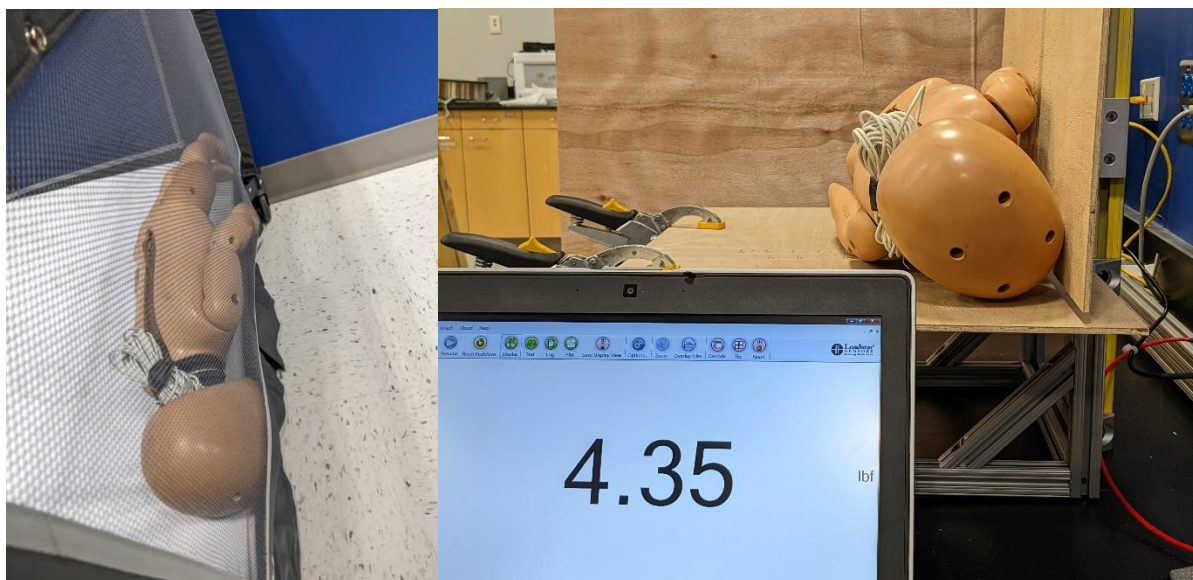


Figure 2. CRABI dummy positioned in play yard (left); CRABI dummy on loadcell test rig (right).

Using the sliding gauge proposed in CPSC's follow-up letter, as shown below in Figure 3, staff applied a 5-pound force on four representative play yard samples at various heights above the floor, representing the thickness of the play yard mattress. Table 2 below describes the resulting gap between the mattress and sidewall with 5-pound force application for each play yard sample. Staff measured the gap at the midpoint of each side of the play yard sample, labeled head, toe, right, and left, where head and toe are the short sides of the rectangular play yard samples. Staff repeated each measurement three times and averaged them in the table below. Staff found that the resulting gap measured between 1.77 and 2.83 inches, when tested 2 inches above the play yard floor and found that the gap increased when the force was applied 3 inches above the play yard floor. The measured initial gaps without an applied force on the sidewall were no more 0.47 inches. This demonstrates that a realistic force from a 5-month-old infant leaning longitudinally against the mesh sidewall can expand the gap between the mattress and sidewall significantly more than the 0.5-inch gap requirement in ASTM F406-22. Although a 0.5-inch gap requirement is the same as the requirement for rigid-sided NFS baby cribs, these data show this requirement does not afford the same level of safety with play yards that have flexible mesh sidewalls because of the ability of the mesh to expand and create a larger gap. Therefore, staff concludes the new requirements in section 5.16.2.2 of ASTM F406-22 do not prevent hazardous gaps that can form when an infant leans against the flexible play yard sidewall and entrap the infant, creating a risk of asphyxia. This is especially true for thicker mattresses that elevate the child further away from the play yard floor that secures the mesh, as Table 1 reflects. Indeed, the difference between the gaps at 1.5 inches above the floor and 2.0 inches above the floor (i.e., ASTM F406-19 vs. ASTM F406-22 maximum mattress thickness requirements) are especially pronounced.

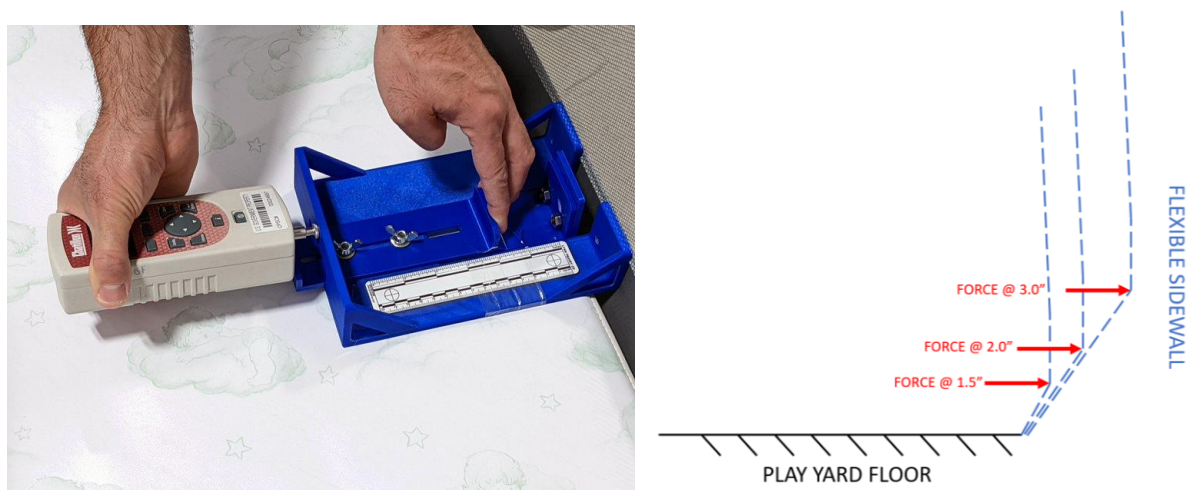


Figure 3. Force application using CPSC's proposed sliding gauge to measure the gap between the mattress and sidewall (left); gap becomes larger with force applied higher above play yard floor (right)

Table 2. Play Yard Sidewall Gap Measurement Data.

Play Yard Sample	Wall	Average Gap w/o Force Applied	Average Gap Measurement with 5-lb. Force (inches)		
			1.5" Above Floor	2" Above Floor	3" Above Floor
A	Head	0.375	1.77	2.54	2.83
	Left	0.345	1.54	2.00	2.21
	Right	0.315	1.48	1.94	2.17
	Toe	0.470	1.73	2.48	2.90
B	Head	0.310	2.02	2.58	2.63
	Left	0.250	1.29	1.77	1.75
	Right	0.250	1.40	2.00	1.85
	Toe	0.310	1.83	2.23	2.21
C	Head	0.280	1.65	2.50	2.54
	Left	0.345	1.63	2.02	2.04
	Right	0.345	1.60	2.06	2.06
	Toe	0.280	1.77	2.75	2.81
D	Head	0.470	1.71	2.83	2.96
	Left	0.315	1.40	2.02	2.19
	Right	0.375	1.44	1.96	2.29
	Toe	0.405	1.88	2.46	2.52

f. Laboratory Testing – Mattress Firmness

A thicker mattress can lead to reductions in safety because ASTM F406-22 also does not address mattress firmness. The new requirement in ASTM F406-22 does not specify a maximum thickness for the mattress filling material, whereas the requirement for mattresses

less than 1.5 inches specifies a maximum of 1 inch of filling material (section 5.16.2 of ASTM F406-22). Therefore, if no structural member is included, ASTM F406-22 allows for mattresses with up to 2 inches of filling material, fabric layers, and vinyl layers, double that of what was previously allowed. This will increase the likelihood of softer mattresses that pose a risk of infants suffocating when face down in a soft mattress that can conform to an infant's face. The mandatory crib mattress rule goes beyond ASTM F406 by requiring a firmness test intended to prevent the hazard of positional asphyxia involving infants suffocating when face down in a soft mattress that can conform to an infant's face. However, while this firmness test applies to after-market play yard mattresses pursuant to the crib mattress rule, OEM mattresses that come included with play yards subject to the play yard rule are not required to test for mattress firmness.

To assess the safety of a 2-inch filled mattress, staff conducted mattress firmness tests in accordance with the crib mattress mandatory standard (16 CFR part 1241, § 1241.2(14)(i)) on mattress samples, including OEM mattresses less than 1.5 inches thick, and after-market mattress samples 2 inches in thickness (*i.e.*, thicker than ASTM F406-19 and CPSC's mandatory crib mattress rule currently allow). Table 3 below summarizes the test results. Staff found that mattresses that comply with the mattress thickness requirements of ASTM F406-19 (1.5 inches or less and no more than 1 inch of filling material), passed the firmness test, whereas mattresses with up to 2 inches of filling material failed. The after-market mattresses consistently failed the firmness test because of a combination of being too soft and lacking rigid structural members, and thus, they tended to sag in between the rigid bars supporting the play yard floor. The mattress firmness test apparatus would sink in between these rigid bars, and therefore, fail the test. This creates a hazardous sleep environment, where an infant can become entrapped face-down in these concavities and be unable to extricate themselves, creating the risk of suffocation.¹⁸ Sufficiently rigid structural members may address this hazard, but ASTM F406-22 does not require a structural support layer for mattresses thicker than 1.5 inches, and does not require firmness testing to identify the hazard.

¹⁸ Commission Briefing Package: Final Rule - Safety Standard for Crib Mattresses: https://cpsc.gov/s3fs-public/Final-Rule-Safety-Standard-for-Crib-Mattresses.pdf?VersionId=62bEXbfu7.mloiiLfn_fbMWtFnEsgGON.

Table 3. Mattress Firmness Test Results.

Mattress	Thickness (inches)		Pass/Fail Firmness Test
A	Filling Material:	0.50	Pass
	Structural:	0.25	
	Total:	0.75	
B	Filling Material:	0.25	Pass
	Structural:	0.25	
	Total:	0.50	
C	Filling Material:	0.375	Pass
	Structural:	0.375	
	Total:	0.75	
D	Filling Material:	1.875	Fail
	Structural:	0	
	Total:	1.875	
E	Filling Material:	1.875	Fail
	Structural:	0	
	Total:	1.875	
F	Filling Material:	2.0	Fail
	Structural:	0	
	Total:	2.0	

g. Staff Assessment

Staff concludes that the requirement for mattresses thicker than 1.5 inches in ASTM F406-22 is a reduction in safety. Because the gap measurement test in ASTM F406-22 does not account for the flexible sidewalls of play yards, hazardous gaps may form when an infant leans into the sidewall and the infant can become entrapped. Additionally, the revised ASTM standard would allow for thicker mattresses without structural members, and with up to 2 inches of filling material, fabric layers, and vinyl layers that may be hazardously soft, and ASTM F406-22 does not have a firmness test to prevent the suffocation hazard for OEM mattresses.

2. Length of Cords/Straps

Play yards and their attaching accessories may feature cords/straps intended for various purposes such as securing the mattress to the play yard floor, or securing an attaching accessory to the play yard frame. Cords or straps, when either connected or entangled together, may form a loop through which an infant may crawl, resulting in strangulation around the neck. To reduce this hazard, ASTM F406-19 specifies requirements for those accessories, as defined in section 3.1.1 and 3.1.4 of ASTM F406-19,¹⁹ that have cords/straps that can form a loop; under this element of ASTM F406-19, the perimeter length of the accessory cords/straps must

¹⁹ Examples of play yard accessories include bassinet or changing tables that attach to the top rail of the play yard frame.

not be more than 16.3 inches.²⁰ ASTM F406-22 adds this as a general requirement that now applies to the whole of in-scope products and not just the attaching accessories. This maximum permissible perimeter length of loop is too small for the standard small head probe based on a 5th percentile 6-month-old child from fitting through the loop and is intended to prevent strangulation hazards. This change now makes all cords/straps, whether attached to the play yard or to an accessory feature, subject to the loop requirement.

ASTM F406-22's loop requirement addresses cords/straps, such as shown in Figure 4 below. ASTM F406-19 limits the free length of any single cord/strap attached to the play yard to no more than 7.4 inches (section 5.13.1 of ASTM F406-19). Thus, if two straps are attached end-to-end, they cannot form a loop greater than 14.8 inches, which is too small for the standard small head probe; this prevents a small infant's head from fitting through the loop. However, as illustrated in Figure 4, products may feature two straps that are attached to the product and separated by a distance L, that can connect to form a loop. Therefore, for a product that complies with ASTM F406-19, the loop formed by the straps in addition to the distance L may exceed the perimeter length of the standard small head probe of 16.3 inches. ASTM F406-22's loop requirement states that the length of the loop is in "conjunction with the product"; thus, the perimeter measurement includes the distance L in the example below. This revision reduces the risk of strangulation with these types of cords/straps.

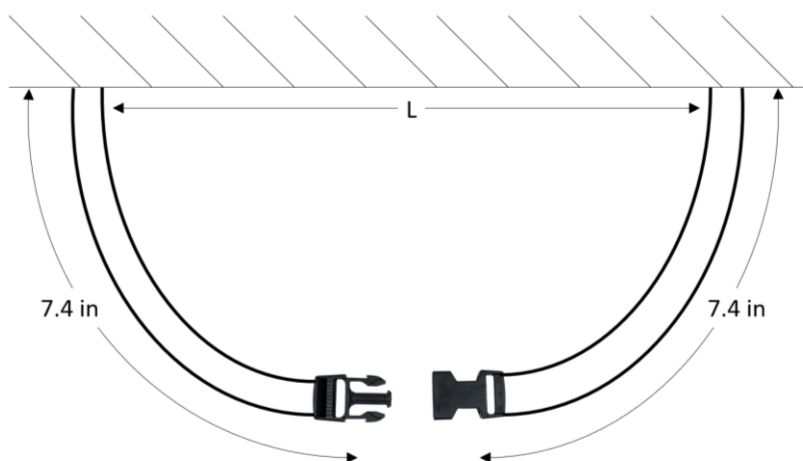


Figure 4. Example of two cords/straps that can form a loop.

ASTM F406-22 also modifies the test method to measure the free-hanging length of single cords/straps in section 8.24.1. The requirement now states, "Using a $\frac{3}{4}$ in. (19 mm) diameter clamping surface (Fig. A1.29), gradually apply a 5 lbf (22 N) force to the end of each cord/strap in its fully-extended configuration." The added phrase "in its fully-extended configuration" accounts for straps that have adjustable lengths with a sliding buckle, making sure they are extended to the strap's maximum length. The update also adds that any hardware attached to

²⁰ ASTM F406-22 defines a "cord" as a length of slender flexible material including monofilaments, rope, woven and twisted cord, plastic and textile tapes, ribbon, and those materials commonly called string. ASTM F406-22 defines a "strap" as a piece of flexible material of which the width is significantly greater than the thickness.

the cords/straps, such as buckles, shall be included in the length measurement. ASTM F406-19 does not specify that hardware should be included. Lastly, the update specifies that if multiple cords/straps attach to the product in the same location (*i.e.*, distance $L = 0$ in Figure 4 above), they are to be treated as separate and measured individually.

Staff concludes that the updates to the cord/strap requirements in ASTM F406-22 are, in themselves, an improvement in safety. The loop requirement that previously was applicable only to cords/straps attached to accessories in ASTM F406-19, is now a general requirement that applies to all parts of in-scope products. The changes to the free-length measurement test method provide additional clarification to the test method in ASTM F406-19 by adding specificity on length of adjustable cords/straps and by including hardware in the measurement.

3. Scope

Section 1.2 of ASTM F406-19 defines the standard's scope: "This specification covers a framed enclosure with a floor made for the purpose of providing sleeping and playing accommodations for a child who cannot climb out and is less than 35 in. (890 mm) in height." Based on this scope, products that are intended to be used for play only, and not for sleep, can be excluded from the requirements of the standard. ASTM F406-22 revises the phrase "... sleeping and playing accommodations ..." to "... sleeping or playing accommodations, or both ..." to account for these types of products. This also prevents manufacturers from exempting their products from the standard by specifying the product is exclusively intended for play. Staff considers this change in ASTM F406-22 to be an improvement in safety because it brings additional products within the scope of the ASTM F406 requirements that are intended to address multiple hazards.

B. Non-substantive changes in ASTM F406-22

1. Accessories Definitions and Entrapment in Accessories Requirements

ASTM F406-22 adds multiple definitions for various types of play yard accessories, including "play yard/non-full-size crib dependent accessories" (section 3.1.23), "full accessories" (section 3.1.23.1), "full bassinet accessories" (section 3.1.23.2), and "bassinet dependent accessories" (section 3.1.23.3).²¹ ASTM F406-19, in contrast, provided only one general definition for "accessories" (section 3.1.1). ASTM F406-22 also revises Section 5.15 *Entrapment in Accessories*, to improve clarity on the types of accessories to which the requirements apply. In ASTM F406-19, the section 5.15 requirements provided a lengthy description stating that these requirements do not apply to accessories that make the non-full-size crib/play yard unusable when the accessory is assembled.²² ASTM F406-22 now defines these types of accessories as "full accessories" (section 3.1.23.1) and removes their description from section 5.15, resulting in a shorter, more concise description. Other than these clarifications, the requirements that

²¹ "Full accessories" are essentially accessories that fully cover the top opening of the product; "full bassinet accessories" are essentially elevated "full accessories;" and "bassinet dependent accessories" are accessories to "full bassinet accessories."

²² For example, an accessory such as a bassinet that covers the entire opening of the play yard will make the lower portion of the product unusable when the accessory is installed.

address entrapment in accessories remain the same. Staff concludes these changes have no effect on safety.

2. Mattress Exception for Products Designed Exclusively for Play

ASTM F406-22 moves from a note to a new requirement (section 5.16.1) the language that a mattress is not required to be provided with a product if the product is designed exclusively for play and not for sleep and is intended to be used without a mattress. Staff concludes this change has no effect on safety.

3. Minor Editorial Changes

ASTM F406-22 includes the following editorial changes:

- In section 8.26, replaces “play yard” and “non-full-size crib” with “product”;
- Globally changes values given with a tolerance to include units for the nominal value (e.g., 27 ± 2 lbf changed to $27 \text{ lbf} \pm 2 \text{ lbf}$); and
- Globally changes two-dimensional measurements to include units for all values (e.g., 2-by-2in. changed to 2-in. by 2-in.).

Staff concludes these editorial changes have no effect on safety.

III. Public Comments

The Commission requested public comment on the effect the revision to ASTM F406 will have on the safety of consumer products covered by the standard, meaning play yards. CPSC received eight public comments. One commenter, Juana Ortiz, generally stated that CPSC must ensure that durable infant and toddler products are safe for their intended use. Another commenter, Health Canada, stated that this new requirement increasing the maximum play yard mattress thickness to 2 inches and test method to measure the gap between the mattress and sidewall do not improve safety. Six industry commenters generally stated that the new mattress thickness requirement and test method in ASTM F406-22 improve safety. Below, staff summarizes the comments by topic and provides staff's response.

Comment 1

Five commenters (Dream On Me, Independent Safety Consulting, DECA Consulting, Juvenile Products Manufacturers Association (JPMA), and Keezio Group) expressed that the new requirement for mattresses greater than 1.5 inches is an increase in safety because it will reduce the likelihood of consumers adding soft bedding to the sleep environment. The commenters referenced a survey conducted in 2013 by Westat, “Durable Nursery Products Exposure Survey (DNPES): Final Summary Report,”²³ which concluded that 75 percent of

²³ The report, “Durable Nursery Products Exposure Survey (DNPES): Final Summary Report,” with CPSC staff's statement, can be accessed using the following URL: <https://www.cpsc.gov/s3fs-public/DurableNurseryProductsExposureSurveyDNPESFinalSummaryReport2014.pdf?VersionId=5R29kvpEAB20KnHt6tFzyTXsKxTvRJsM> (or see CPSC.gov, “Other Technical Reports”).

consumers perceived play yards to be uncomfortable and added soft bedding under their child for increased comfort.

Response 1

The DNPES study conducted in 2013 collected information about consumers' use of durable infant and toddler products. The survey used a national probability sample of households with children 5 years old and under. Among other questions, participants were asked about items added to sleep products under their children. The sleep product categories included cribs, play yards, bedside sleepers, bassinets, cradles, and infant hammocks. The researchers found that approximately 75 percent of play yard users reported placing an item (in addition to the intended mattress) under the child in a play yard. The items included blankets or quilts (~62%), pillows (~26%), and mattress pads (~12%). Approximately 25 percent of the respondents reported not placing anything under their child other than the intended mattress. None of the respondents indicated that they used fitted sheets for play yards. In comparison, approximately 94 percent of crib users reported placing an item (in addition to the intended mattress) under the child in their crib. Items included fitted sheets (~84%), mattress pads (~50%), blankets or quilts (~36%), and pillows (~23%). Approximately 6 percent of the respondents reported not placing anything under their child other than the intended mattress.

Considering the large percentage of DNPES respondents who used fitted sheets for cribs and given that none of the respondents reported using fitted sheets for play yards, it is likely that respondents used soft bedding in play yards for purposes other than just added padding, such as warmth and covering the mattress. Similar research, such as the *Consumer Product Safety Commission (CPSC): Caregiver Perceptions and Reactions to Safety Messaging Final Report* completed in 2019, found that consumers commonly reported adding soft bedding to cribs (as well as play yards) for comfort and warmth.²⁴ These findings, along with CPSC incident data, demonstrate that consumers commonly add padding and soft bedding to baby cribs, which typically have mattresses measuring 3 to 6 inches in thickness. Furthermore, incident data demonstrate use of soft bedding with play yard after-market mattresses measuring in excess of 3 inches. The existing data therefore do not support the commenters' argument that increasing the maximum play yard mattress thickness from 1.5 inches to 2 inches will reduce the use of soft bedding in play yards.

Comment 2

Six commenters (Iron Mountains, Dream On Me, Independent Safety Consulting, DECA Consulting, JPMA, and Keezio Group) stated that adding a mattress gap requirement and measurement test are an increase in safety because ASTM F406-19 does not contain such a test. Four of these commenters (Dream On Me, Independent Safety Consulting, DECA Consulting, and JPMA) opined that a gap requirement of 0.5 inches is demonstrated to be safe

²⁴ The report, "Consumer Product Safety Commission (CPSC): Caregiver Perceptions and Reactions to Safety Messaging Final Report," with CPSC staff's statement, can be accessed using the following URL: <https://www.cpsc.gov/content/Consumer-Product-Safety-Commission-Caregiver-Perceptions-and-Reactions-to-Safety-Messaging-Final-Report> (or see CPSC.gov, "Other Technical Reports").

based on incident data²⁵ from the CPSC between January 1, 2000, and December 31, 2016. They claimed that the data show that no incidents have occurred in that timeframe involving mattresses less than 2 inches thick and gaps measuring 2 inches or less.

Consumer and Hazardous Product Safety Directorate, Health Canada, however, stated that the gap measurement test in ASTM F406-22 is a reduction in safety because it does not include an outward force against the flexible play yard sidewall. They stated that there is a potential entrapment and suffocation hazard involving a child potentially rolling into the gap between the mattress and sidewall. In Health Canada's view, adding a force application into the sidewall for the gap measurement test would sufficiently address this hazard, particularly with the emergence of play yards with more flexible, mesh sidewalls than previous products in the market.

Response 2

Staff agrees with Health Canada's comment, and staff does not agree with the other commenters' statements that a 0.5-inch static gap measurement improves safety and that the incident data supports this conclusion. As discussed above, staff's laboratory testing on various play yard samples demonstrates that a reasonable magnitude of force representative of a 95th percentile 3-to-5-month-old infant, applied to mesh sidewalls, causes them to deflect outward to varying degrees across play yard products, potentially creating a hazardous gap in which an infant (or body part, including an arm, leg, or head) can become entrapped when the mattress is 2 or more inches thick. The static gap measurement in ASTM F406-22 does not take account of this foreseeable outward force. Given that the resultant deflection causes a hazardous gap from which an infant may be unable to extricate itself, staff's assessment is that the standard's static gap measurement does not improve safety.

Regarding commenters' claims about data supporting their conclusion, staff notes that the Commission's incident data is obtained from multiple sources, such as the National Electronic Injury Surveillance System (NEISS) and the Consumer Product Safety Risk Management System (CPSRMS). The NEISS data are based on a nationally representative probability sample of hospitals in the U.S., and therefore can be used to make estimates. However, these data draw upon medical treatment records from emergency departments, which do not typically include enough information to discern the thickness of involved mattresses and the sizes of sidewall and corner gaps. The CPSRMS data include anecdotal reports of incidents received by CPSC, such as "external cause"-based death certificates purchased by CPSC, in-depth investigations of these anecdotal reports, and investigations of select NEISS injuries. Examples of documents in CPSRMS include hotline reports, internet reports, news reports, medical examiner's reports, death certificates, retailer/manufacturer reports, and documents sent by state/local authorities, among others. While some of these reports specify the thickness of involved mattresses and the sizes of sidewall and corner gaps, others do not, and they are

²⁵ Commission Briefing Package: Petition CP 15-2 - Petition Requesting Ban on Supplemental Mattress for Play Yards with Non-Rigid Sides - May 10 2017_ with addendum: https://cpsc.gov/s3fs-public/Petition-CP-15-2-Petition-Requesting-Ban-on-Supplemental-Mattress-for-Play-Yards-with-Non-Rigid-Sides-May-10-2017_with-addendum.pdf?VersionId=A5jHAF103hZufDVuoRTKsfT9nu9dk4ly.

especially unlikely to indicate gap measurements with a horizontal force applied against the sidewall(s) of the play yard. Additionally, because CPSRMS data are anecdotal, statistically based analysis on this data can be unreliable and staff is unable to infer missing data. Given these limitations of the incident data, staff cannot solely rely on the incident data in this case to determine whether entrapment incidents between January 1, 2000, and December 31, 2016, involved circumstances in which the mattress was 2 inches or less in thickness and the gap was 2 inches or less in width. Rather, staff relies on incident data, along with engineering principles, laboratory test data, and expert opinion to determine hazard formation. ASTM F406-22 has no test for the amount of deflection allowed for a mesh sidewall. Mesh sidewalls are flexible and deflect when outward forces are applied, such as a baby leaning against the side, creating a suffocation hazard; a static measurement of a moving variable does not accurately test the hazard pattern presented by gap entrapment.

Comment 3

Three commenters (Iron Mountains, Independent Safety Consulting, and JPMA) stated that the addition of a general requirement for cords/straps that can form a loop improves safety. The commenters noted that previously, the requirement only restricted the free length of stretched cords/straps to no more than 7.4 inches, but the new requirement is an added protection from the risk of cords/straps that can form a loop. Health Canada stated that the cords/straps requirement aligns with Canada's current regulations for play yards, cribs, cradles, and bassinets.

Response 3

Staff agrees with the commenters that the addition of a general requirement for cords/straps that can form a loop improves safety. The loop requirement, which was previously only applicable to cords/straps attached to accessories in ASTM F406-19, is now a general requirement that applies to all parts of in-scope products.

Comment 4

One commenter (DECA Consulting) argued that CPSC staff's proposal to add a sideways force to the gap measurement test will result in failure when the mattress is thicker than 1.5 inches. The commenter stated that mattresses thicker than 1.5 inches are known to be safe based on incident data, and that establishing overly restrictive requirements would result in higher costs, lower availability of safe solutions, and reduction of product utility.

Response 4

Section 104(b)(4)(B) of the CPSA (15 U.S.C. § 2056a(b)(4)(B)) requires the Commission to determine whether ASTM's revised voluntary standard improves the safety of the consumer product covered by the standard. Staff is concerned, as detailed above, that ASTM F406-22 increases the maximum allowable thickness of a play yard mattress without consideration for the firmness of the mattress or necessary structural supports. These new requirements could introduce a suffocation hazard due to a soft mattress occluding an infant's nose and mouth

when sleeping facedown or the formation of a pocket (gap) between the mesh sidewall and the mattress in which an infant can become entrapped.

Staff's testing indicates that existing 1-inch to 1.5-inch-thick OEM play yard mattresses pass the mattress firmness test specified in the mandatory *Safety Standard for Crib Mattress, 16 CFR part 1241*, while 2-inch-thick after-market mattresses can fail the mattress firmness test. ASTM F406-22 allows OEM play yard mattresses of increased thickness that could be less firm than the crib mattress standard allows, because the firmness tests apply only to after-market mattresses and not to OEM mattresses—the revision in ASTM F406-22 therefore reduces safety by permitting mattresses that present a suffocation risk.

Staff's testing also demonstrates that the flexibility of play yards' mesh sidewalls varies inconsistently within a product, and across products; in some cases, the flexibility increases when tested at higher heights along the side of the play yard wall. The looser the play yard mesh, the larger the potential side gap when an appropriate force is applied. Every play yard tested had one or more sides that created more than a 2-inch gap when a 5-lb. force representative of a 95th percentile weight of a 3-to-5-month-old infant leaning against the wall was applied to the sidewall 2 or more inches above the play yard floor. Finally, while this commenter noted that the deaths involved in CPSC's 2016 data pull all involved gaps larger than 2 inches, because of the limitations of incident data discussed above, staff cannot rely on incident data alone to determine a safe gap size.

Staff concludes that ASTM's gap requirement of 0.5 inches or less with no force applied against the sidewall, is inadequate. The measurement test does not appropriately test for the gap because foreseeable, real-world conditions such as a flexible mesh sidewall and a soft mattress are not adequately tested.

Comment 5

One commenter (DECA) stated that supplemental mattresses for play yards have been banned, and therefore consumers will seek other options for comfort.

Response 5

The crib mattress rule addresses hazards associated with after-market play yard mattresses, formerly termed supplemental mattresses, by incorporating by reference ASTM F2933-21 with modifications to improve safety, and regulates these previously unregulated products as provided in ASTM F2933 since 2018, and as required by section 104(a) of the CPSIA.

IV. Staff's Assessment of the Revised Standard

Under CPSIA section 104(b)(4)(B), unless the Commission timely determines that ASTM's revision to a voluntary standard that is referenced in a mandatory standard "does not improve the safety of the consumer product covered by the standard," the revised voluntary standard becomes the new mandatory standard. Staff concludes that the substantive changes in ASTM F406-22 related to play yards are a net reduction in safety because the requirements for play yard mattresses above 1.5 inches do not account for gap entrapment based on the flexible

nature of play yard sidewalls and do not account for suffocation hazards associated with increased softness of thicker mattresses. Staff found that a representative magnitude of force applied to mesh sidewalls can outwardly deflect the sidewall, creating a potentially hazardous gap in which an infant can become entrapped. Staff also found that mattresses with 2 inches of filling material can fail the mattress firmness test from the mandatory standard for crib mattresses, 16 CFR part 1241, which is intended to reduce hazards of positional asphyxia involving infants suffocating while face down in a soft mattress.

V. Recommendation

Pursuant to section 104(b)(4)(B) of the CPSIA, because CPSC staff assesses that ASTM's revised voluntary standard is a reduction in safety for play yards, staff recommends that the Commission reject ASTM F406-22 and recommends that the Commission direct the staff to notify ASTM by March 5, 2023, that the Commission has determined that the proposed revision does not improve the safety of play yards and that the Commission will retain ASTM F406-19, with modifications, as the mandatory standard.

Appendix

In-Depth Description of each Fatality Scenario

Wedging/Entrapment or Gap Present Between Mattress and an End/Side Wall of Play Yard (21 deaths)

Among the 21 wedging/entrapment deaths, two deaths involved an OEM play yard mattress, 13 deaths involved after-market mattresses, and for six mattresses it is unknown whether the mattress was an OEM or an after-market mattress.

OEM Play Yard Mattress (2 deaths)

Incident 1 (from 2015; IDI²⁶ 150807CCC1815): This 7-month-old child was placed in a play yard face up wearing a cotton one-piece clothing article, and the child was found partially wedged in a gap between an OEM mattress and a mesh wall in the corner of the play yard, with the face of the child in contact with the mattress. The play yard was rectangular in shape and about the same size as a standard crib. Beside the OEM mattress with no sheet covering the pad, no other items were reported present in the play yard environment.

Incident 2 (from 2017; IDI 170718CCC3096): This 7-week-old child was placed in a play yard face up with a blanket covering the body up to the chest area; the child was found with the face in an existing gap between the mattress and the middle of one of the long-side walls of the play yard. The play yard was rectangular in shape and about the same size as a standard crib. The play yard included an OEM mattress which consisted of two parts that were held fastened together but with no sheet covering the mattress; a doll; a stuffed animal; and a balled-up blanket. The child reportedly was not in contact with the blanket or toys when found.

After-Market Mattress (13 deaths)

Incident 3 (from 2011; IDI 120611CCC1731): This 8-month-old child was placed in a play yard in an unknown position and was found face down with the body entrapped in an existing gap of approximately 3 inches between a crib mattress and the side mesh wall of the play yard. The play yard was rectangular in shape and about the same size as a standard crib. The play yard included a crib mattress with a loose-fitting sheet placed atop the OEM mattress; a bunched-up blanket; and three stuffed animal-like toys. It is unclear from the reports if any of the materials was touching or near the child's face when found.

Incident 4 (from 2013; IDI 140702CCC3689): This 3-month-old child wearing only a diaper was placed in a play yard in an unknown position and found with the face and left shoulder of the child entrapped in an existing gap of approximately 2 or 3 inches between a full-sized crib mattress and a side mesh wall of the play yard. The play yard was rectangular in shape and about the same size as a standard crib. Included in the play yard were: a crib mattress with a properly fitting fitted sheet placed atop the OEM mattress; a stuffed animal; two rattle toys; a

²⁶ IDI stands for In-Depth Investigation.

pair of infant shorts; a pacifier; and two blankets that were draped over the rail on one end of the play yard and remained on the rail during the incident.

Incident 5 (from 2014; IDI 140609CCC1675): This 3-month-old child was placed in a play yard along with his twin on top of two mattresses, face down; child was found wedged in an existing gap of approximately 1.5 inches between the top thicker mattress and the side mesh wall of the play yard. The child's face was pressed into the side of the top mattress. The top mattress was reportedly between 3.75 and 4 inches thick, and the width of the top mattress was 2 inches shorter than the bottom mattress, which created the gap where the child became wedged. The bottom mattress was between 2 inches and 2.5 inches thick and left no gap between the mattress and the play yard walls. There was no product information on these two mattresses, and it is possible that these were home made products made from foam and covering material. The OEM mattress was likely not present in the play yard during the incident. The play yard was rectangular in shape and about the same size as a standard crib. Included in the play yard were two mattresses (unknown whether after-market or homemade) with a loose-fitting fitted sheet on the topmost mattress; and the twin of the victim. No other items were reportedly present in the play yard environment.

Incident 6 (from 2014; IDI 150407HCC1448): This 7-week-old child was placed in a play yard face up wearing a diaper, one-piece clothing article, sweatpants, and socks, and found wedged in a gap of approximately 5 inches to 7 inches between a crib mattress and a side mesh wall of the play yard, with the face pressed into the mesh on the bottom of the play yard. The OEM mattress was not present in the play yard during the incident, which exposed the bottom mesh of the play yard. The play yard was rectangular in shape and about the same size as a standard crib. Included in the play yard were: a crib mattress (unknown if a fitted sheet was present); a baby quilt; a small blanket; and a pair of socks.

Incident 7 (from 2015; IDI 160812HCC2772): This 4-month-old child was placed in a play yard face down. According to the detectives, the victim was found on his side with his face against the play yard's mesh side, and the sidewall gap was approximately 1 inch. It is unknown whether the OEM mattress was present in the play yard during the incident. The play yard was rectangular in shape and about the same size as a standard crib. Included in the play yard were: an after-market mattress (unknown if a fitted sheet was present); and at the opposite end of the play yard there was a blanket and a towel.

Incident 8 (from 2017; IDI 181105HCC3067): This 5-month-old child was placed in a play yard face up wearing a diaper and a one-piece clothing article and found face down with body lying in a sideways position with right side including arm, leg, and face entrapped in a gap of approximately 1.5 inches between an added crib mattress approximately 5.5 inches to 6-inches thick and a side mesh wall of the play yard. The face was wedged between the mattress and the mesh side wall of the play yard. The play yard was rectangular in shape and about the same size as a standard crib. Besides a crib mattress with a tight-fitting sheet placed atop the OEM mattress, no other items were present in the play yard.

Incident 9 (from 2017; IDI 190603HCC1480): This 8-month-old child was placed in a play yard face up wearing a diaper and a long-sleeved one-piece clothing article and found with body lying in a sideways position with left side, including left arm and leg, entrapped in a gap of approximately 1.5 inches between two added after-market mattresses that were each approximately 3-inches thick, and a side mesh wall of the play yard. The face of the child was

facing the side of the bottommost after-market mattress. The play yard was rectangular in shape and about the same size as a standard crib. Included in the play yard were: two after-market crib mattresses (the bottom mattress had a fitted sheet, and the top mattress had no sheet) placed atop the OEM mattress; and a blanket the size of a dish towel.

Incident 10 (from 2018; document number X1970400A): This 4-month-old child was placed in a play yard in an unknown position and found face up and partially wedged in an existing gap of an unknown size between an added after-market mattress and a side mesh wall of the play yard. The gap was filled by a rolled-up fleece blanket. The size and shape of the play yard are unknown. Beside the added after-market mattress and a fleece blanket, no other items were reported present in the play yard environment.

Incident 11 (from 2019; IDI 200127CBB1242): There were slightly conflicting reports about the details regarding this incident. This 6-month-old child was placed in a play yard either face up or on the left side wearing a diaper, a dress, and pants, with a polyester blanket covering the lower legs of the child and found entrapped in a gap of an unknown size, between an after-market mattress and a side mesh wall of the play yard. The head of the child was either wedged under the mattress or between the mattress and mesh side wall of the play yard. It is unknown whether the OEM mattress was present in the play yard during the incident. The play yard was rectangular in shape and about the same size as a standard crib, and other than the after-market mattress covered by a fitted sheet and a polyester blanket, no other items were reported present in the play yard environment.

Incident 12 (from 2020; IDI 210405HCC3819): This 8-month-old child was placed in a play yard face up wearing a diaper and a shirt and found with one leg on top of the top mattress and the other leg, torso, and head entrapped in an existing gap of approximately 1.5 to 2 inches between an added 5-inch-thick mattress and a side mesh wall of the play yard. The face of the child was pressed into one of the mattresses. The top five-inch-thick mattress was placed atop either the OEM mattress or a second, 1-inch-thick after-market mattress. The play yard was rectangular in shape and about the same size as a standard crib. Besides a 5-inch-thick after-market mattress (unknown if a fitted sheet was present) and a 1-inch-thick second mattress, no other items were reported present in the play yard environment.

Incident 13 (from 2020; IDI 210402HCC1642): This 3-month-old child was placed in a play yard face down wearing a diaper and a one-piece clothing article and found face down entrapped in a gap of an unknown size between a 4-inch-thick crib mattress and a side mesh wall of the play yard. The crib mattress was 10 inches shorter than the length of the play yard and 4 inches shorter than the width of the play yard, which left considerable gaps on at least two sides of the play yard, and possibly left gaps on all four sides. It is unknown whether the OEM mattress was present in the play yard during the incident. The play yard was rectangular in shape and about the same size as a standard crib, and other than the crib mattress covered by a fitted sheet and a pacifier, no other items were reported present in the play yard environment.

Incident 14 (from 2020; IDI 211013HCC3040): This 5-month-old child was placed in a play yard in an unknown position and found with the body wedged in a gap of an unknown size, between an after-market mattress, one or more blankets, and a mesh side wall of the play yard. The face of the child was pressed into a mesh side wall of the play yard. The play yard was rectangular in shape and about the same size as a standard crib. Included in the play yard were: an after-market memory foam mattress; one or more heavy blankets; and an adult pillow.

Incident 15 (from 2021; IDI 220321HCC1228): This 3-month-old child was placed in a play yard face down and found face down entrapped in an existing gap of “a few inches” between an after-market mattress and a side mesh wall of the play yard. It is unknown whether the OEM mattress was present in the play yard during the incident. The play yard was rectangular in shape and about the same size as a standard crib, and other than the added after-market mattress (unknown if the mattress was covered by a sheet or topper), no other items were reported present in the play yard environment.

Unknown or Vague Description of the Mattress (6 deaths)

Incident 16 (from 2010; IDI 110303CCC1350): This 2-month-old was placed in a play yard face down. The cause of death was ruled an “accident” and recorded as “asphyxia due to wedging of face in corner of playpen”, while lying on a mattress (unknown what kind of mattress or if a fitted sheet was present) with the head and mouth pressed up against a mesh wall of the play yard. The details regarding the circumstances that led to this fatality are vague. Items reported present in the play yard were: an unknown type of mattress; a sleeping positioner pad; and several blankets. The size and shape of the play yard are unknown.

Incident 17 (from 2014; document number X1460710A): This 6-week-old child was placed in a play yard in an unknown position and found face down entrapped between a mattress (unknown what kind of mattress or if a fitted sheet was present) and a mesh side wall of the play yard. The details regarding the circumstances that led to this fatality are vague; no other items were reported present in the play yard during this incident. The size and shape of the play yard are unknown.

Incident 18 (from 2014; IDI 161027CCC1134): This 6-month-old child was placed in a play yard in an unknown position and found entrapped between a mattress (unknown what kind of mattress or if a fitted sheet was present) and a mesh wall of the play yard. The details regarding the circumstances that led to this fatality are vague, and no other items were reported present in the play yard environment. The size and shape of the play yard are unknown.

Incident 19 (from 2020; document number X2120497A): This 5-month-old child was placed in a play yard in an unknown position and found entrapped between a mattress (unknown what kind of mattress or if a fitted sheet was present) and a mesh wall of the play yard. The details regarding the circumstances that led to this fatality are vague, and no other items were reported present in the play yard environment. The size and shape of the play yard are unknown.

Incident 20 (from 2020; document number X2140213A): This 11-month-old child was placed in a play yard in an unknown position and found wedged between the “cushion and lining of (a play yard).” The details regarding the circumstances that led to this fatality are vague, and no other items were reported present in the play yard environment. The size and shape of the play yard are unknown.

Incident 21 (from 2020; IDI 210305HCC2409): This 4-month-old child was placed in a play yard face down and found with the body lying in a sideways position entrapped between a mattress (unknown what kind of mattress or if a fitted sheet was present) and a mesh wall of the play yard. The details regarding the circumstances that led to this fatality are vague, and no other items were reported present in the play yard environment. The size and shape of the play yard are unknown.

Mattress Shifted Allowing Contact or Entrapment with the Fabric Bottom of the Play Yard: Child moved the mattress up and had at least some body part trapped under the mattress (3 deaths)

Incident 22 (from 2011; IDI 130219CCC3404): This 11-month-old child was placed in a play yard in a sitting position, and the child was found with the head entrapped under an OEM mattress, such that the pad was pressed against the throat of the child. The body of the child was in a near standing position with feet planted on the top of the mattress, and the upper torso hunched over with the buttocks pointed upward. The play yard was rectangular in shape and about the same size as a standard crib. Beside an OEM mattress covered by an “unspecified sheet,” no other items were reported present in the play yard environment.

Incident 23 (from 2016; document number 170613CCC1957): This 9-month-old child was placed in a play yard face up with the torso covered by a blanket and found face down in a corner of the play yard, lying suspended on the bottom fabric of the play yard. The OEM mattress “shifted” up allowing the child to become entrapped under the mattress. The play yard was rectangular in shape and about the same size as a standard crib. Besides an OEM mattress with a loose-fitting fitted sheet and a blanket, no other items were reported present in the play yard environment.

Incident 24 (from 2016; document number 170417CCC2592): This 6-month-old child was placed in a play yard face up and found face down in an end of the play yard after pushing an OEM mattress aside and suffocating on the bottom fabric of the play yard. The OEM mattress was not properly fastened in place. The play yard was rectangular in shape and about the same size as a standard crib. There were no items reported present in the play yard environment.