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Transmitted Via Email

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Mr. Al Kaufman, ASTM F15.22 Task Group Chair
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Dear Ms. Lawrence and Mr. Kaufman:

President Biden signed Reese's Law (Pub. L. No. 117-171) on August 16, 2022, directing the U.S. Consumer Product Safety Commission¹ (CPSC) to promulgate a rule within one year to eliminate or adequately reduce the risk of injury from ingestion of button cell or coin batteries by children 6 years old and younger. The Commission voted in January 2023 to publish a Notice of Proposed Rulemaking (NPR) to implement section 2 of Reese's Law, and the NPR was published on February 9, 2023.² The NPR summarizes staff's review of incident data related to button cell or coin battery ingestion. The data were used to identify hazard patterns and products associated with battery ingestion.

Based on a review of NEISS data, staff estimates that from January 1, 2011 through December 31, 2021, 54,300 emergency department-treated incidents involved button cell or coin battery ingestion or insertion into the mouth, nose, or ear. Of these 54,300 cases, staff identified 11,900 (22%) button cell or coin batteries to have come from a product and estimated 4,400 out of 11,900 (37%) batteries as having come out of a toy or game. Based on a review of CPSRMS data, staff identified 25 fatalities from January 1, 2011 through December 31, 2021 resulting from button cell or coin battery ingestion, including one fatality, involving a toy or game. Additionally, staff identified 43 out of 87 nonfatal incidents from January 1, 2016 through December 31, 2021 involving button cell or coin batteries from toys or games, including 20 ingestion incidents and 23 battery access incidents. Staff identified some of these products as subject to the requirements of the toy safety standard; others were not subject, or no determination could be made.

Separate from the product testing reported in the NPR, staff conducted testing of eight toy products and compared the performance of these products when tested to ASTM F963-17 and UL 4200A. Seven of the eight toy products tested were associated with incidents where a child

¹ The views expressed in this letter are those of CPSC staff, and they have not been reviewed or approved by, and may not necessarily reflect the views, of the Commission.

² Federal Register Notice: <https://www.federalregister.gov/documents/2023/02/09/2023-02356/safety-standard-and-notification-requirements-for-button-cell-or-coin-batteries-and-consumer>

gained access to the battery. Staff tested a minimum of three samples for each product, and a product failed the test if at least one sample failed. Staff treated each product as a handheld product (*i.e.*, dropped ten times) when testing in accordance with UL 4200A. Table 1 provides a summary of the testing.

Table 1. Summary of Toy Product Performance Testing to ASTM F963-17 and UL 4200A.

Product #	Locking Type	Incident	ASTM F963 Pass/Fail	UL 4200A Pass/Fail	Performance Failure
1	Sealed	H20C0039A [†]	Pass	Pass	N/A
2	Captive Screw	Manufacturer/Retailer Report	Pass	Fail*	See note
3	Captive Screw	N/A	Pass	Fail*	6.3.3 UL Impact Testing; See note
4	Tool	I17B0493A, [†] I2060383A [†]	Pass	Fail	6.3.2 UL Drop Test; 6.3.5.1 UL Accessibility Test
5	Non-Captive Screw	211221HCC3333, [†] I2170308A [†]	Fail	Fail*	8.7.1 ASTM F963 Drop Test; 6.3.2 UL Drop Test; See note
6	Non-Captive Screw	I16C0676A [†]	Pass	Fail*	See note
7	Non-Captive Screw	I17C0454A [†]	Pass	Fail*	See note
8	Captive Screw	I17C0455A [†]	Pass	Fail*	See note

*Note: products with screws could not reach the specified torque requirements in the battery replacement test, 6.2.1 b), without stripping the threads. In the interest of comparing the other performance criteria, the screws were only tightened until flush with the product after a sample was observed to be failing this requirement.

[†]The incident narrative is available in the CPSRMS data provided with CPSC staff's letter dated August 19, 2022.

Seven of the eight toy products passed performance requirements in ASTM F963, and seven out of eight products failed performance requirements in UL 4200A. Four of seven toy products that failed the performance requirements in UL 4200A would likely have passed performance requirements with a more durable screw housing. Toy products using non-captive screws for the locking mechanism did not meet the construction requirements of UL 4200A. Incident narratives for the toy products refer to screw-related failures and product durability failures. Testing demonstrates that the performance requirements in UL 4200A are more likely to address known hazard patterns.³

While Reese's Law exempts toy products in compliance with the battery accessibility and labeling requirements of 16 CFR 1250 (codifying ASTM F963-17), staff reviewed voluntary standards, including ASTM F963-17, to consider whether any voluntary standard met the requirements in section 2(d) of Reese's Law, meaning the standard eliminates or adequately reduces the risk of button cell or coin battery ingestion by children that are six years of age or younger during reasonably foreseeable use or misuse conditions. Table 6 and Table 7 of the NPR (88 *Fed. Reg.* at 8,700-8,701) summarize the requirements found in ASTM F963 and three other voluntary standards, and staff's assessment of the mechanical requirements in each of the

³ The Reese's Law NPR proposes performance requirements based on ASTM F963, UL 4200A, IEC 62368-1, and IEC 62115.

standards, respectively. Each requirement category addressed a hazard associated with products containing button cell or coin batteries. We also provide below staff's assessment of each requirement category where ASTM F963 was found to be inadequate or did not address the requirement.

A. Construction Requirements

Section 1263.3(b)(i) of the NPR (88 *Fed. Reg.* p. 8,721) contains proposed battery compartment construction requirements.

1. Captive Screws

The NPR proposes that screws or fasteners used to secure the battery compartment enclosure must be captive to the compartment door, cover, or closure. Screws or other fasteners that stay with the product or battery compartment cover are less likely to be lost and are expected to be utilized effectively with greater frequency. The ASTM toy subcommittee recently balloted a requirement to this effect, and staff appreciates that step towards improved safety.

IEC 62115 contains a similar requirement but adds that the screw or fastener must withstand a force of 20 N for 10 s in any direction without becoming separated. The NPR does not propose this requirement, but staff asks the subcommittee to consider whether a similar requirement would be suitable in the ASTM toy standard to add a measurable criterion for captive screws and fasteners.

2. Threaded Attachment Requirements

The NPR proposes minimum requirements for the securement of twist-on access covers and fasteners to ensure they engage and do not accidentally release. Opening a battery compartment secured by one or more screws, or a twist-on access cover, must require a minimum torque of 0.5 Nm (4.4 in-lb) and a minimum angle of 90 degrees of rotation, or the fastener(s) must engage a minimum of two full threads.

Staff advises the subcommittee to consider a similar requirement for ASTM F963 for toys containing button cell or coin batteries. This requirement would improve the security of the battery compartments, and would help to address incidents involving screws of insufficient length.

3. Opens with Two Simultaneous and Independent Movements

The NPR proposes to allow battery compartment enclosures to be secured such that opening the compartment requires a minimum of two independent and simultaneous hand movements. The movements cannot be combinable to single movement with a single finger or digit. The NPR requests comments on whether the rule should allow these locking mechanisms.

ASTM F963 has long relied on a requirement that battery compartments containing small batteries must be opened with a tool, and the requirement has undoubtedly saved lives. However, incident data shows that screws and fasteners can be fallible. Other requirements for screws and fasteners proposed in the NPR and addressed in this letter will help improve their performance, but another approach is to do away with screws and fasteners altogether. Staff do not suggest at this time that ASTM F963 allow battery compartments that open with two

simultaneous and independent movements, but if the subcommittee is interested in discussing the merits of the approach, staff will participate.

B. Use and Abuse Requirements

Section 1263.3(e) of the NPR contains proposed performance tests (88 *Fed. Reg.* 8,722-23).

1. Pre-conditioning in Oven

The NPR proposes that products with thermoplastic battery compartments be placed in a circulating air oven for at least 7 hours, using an oven temperature of the higher of at least 70°C (158°F) or at least 10°C (18°F) higher than the maximum temperature of thermoplastic battery compartment enclosures, doors/covers, or door/cover opening mechanisms during the most stringent normal operation of the consumer product. Staff observed in testing that this pre-conditioning simulating battery operation had a meaningful effect on the performance of plastic battery compartments.

ASTM F963 requires that battery surface temperatures not exceed 71°C, which is within the range of temperatures intended to be addressed by the pre-conditioning requirement. Staff urges the subcommittee to consider a similar requirement for toys containing button cell or coin batteries, to address possible changes in mechanical performance of the battery compartment as a result of battery heating.

2. Open/close and remove/install battery/screw(s) 10 times

The NPR proposes a test to simulate replacing button cell or coin batteries 10 times per the manufacturer's instructions. The battery compartment enclosure is opened, the battery is removed and replaced, and the battery compartment is closed during each cycle. For battery compartment enclosures that are secured with a screw(s), the screw(s) must be loosened and then tightened using a suitable screwdriver, applying a continuous linear torque according to the Torque to be Applied to Screws table, Table 20, of the Standard for Audio, Video and Similar Electronic Apparatus – Safety Requirements, UL 60065. Screws that do not meet the specified torque requirements are removed, and the battery compartment is tested for accessibility.

Staff requests that the subcommittee consider a similar requirement for toys containing button cell or coin batteries, to address mechanical hazards associated with battery replacement, such as stripped threads or other wear and tear, and to precondition the product's battery enclosure to be tested in a weakened state during additional use and abuse testing. Incident data include references to screws that continue to spin or that do not tighten in the product. UL 4200A, IEC 62368-1, and IEC 62115 contain requirements similar to those suggested by staff.

3. Drop Test

The NPR proposes that all subject products be dropped ten times from a height of 1.0 m (39.4 in) onto a horizontal hardwood surface in positions likely to produce the maximum force on the battery compartment enclosure.

This recommendation differs from ASTM F963 in height, frequency, orientation, and impact surface, and does not use age grading.

Height

The NPR's recommended height of 1.0 m is based on UL 4200A (1.0 m), IEC 62115 (93 cm ± 5 cm), and IEC 62368-1 (up to 1,000 mm ± 10 mm for hand-held equipment, direct plug-in equipment, and transportable equipment).

ASTM F963's recommended height of 3 ft, 0.5 in (0.93 m) (for most ages) is slightly less than 1 m, but consistent with IEC 62115. Drop testing from a greater height will result in more durable products. Staff requests that the subcommittee consider raising the minimum recommended height to 1.0 m to better address the risk of injury from battery ingestion.

Frequency

The NPR's recommended frequency of 10 drops is based on UL 4200A's requirements for hand-held products. Most products containing replaceable button cell or coin batteries are small, and staff testing of products containing button cell or coin batteries found that 10 drops was adequate to address the hazard.

ASTM F963 uses age grading and product weight to determine whether a toy is dropped from 0 to 10 times. The subcommittee recently balloted a change that would require toys with small batteries for children 8 years and older to be tested using the parameters for children aged over 36 months up to 96 months. Staff appreciates this advance and believes that this will fill a gap in toy product testing. However, a requirement of 10 drops for toy products containing replaceable button cell or coin batteries would help address the hazard posed by the possible ingestion of such batteries, and result in more durable toys. Staff requests that the subcommittee consider such a requirement.

Orientation

The NPR recommends that products be dropped in an orientation likely to produce maximum force on the battery compartment enclosure. This requirement, based on UL 4200A and IEC 62368-1, is intended to address the particular hazard of the battery compartment opening and allowing access to the battery. ASTM F963 is not focused on this hazard, and thus allows the drops to be in random orientation.

To reduce the risk of battery ingestion, staff suggests the subcommittee consider requiring toys containing button cell or coin batteries to be dropped in an orientation likely to produce the maximum force on the battery compartment enclosure.

Impact Surface

The NPR recommends that products be dropped on a hardwood surface. The hardwood surface must be at least 13 mm (0.5 in) thick, mounted on two layers of nominal 19 mm (0.75 in) thick plywood, and placed on a concrete or equivalent non-resilient surface.

ASTM F963 requires the impact surface to consist of 1/8-in (3-mm) nominal thickness Type IV vinyl composition tile consistent with Federal Specification SS-T-312B, over concrete. The ASTM toy subcommittee has recently balloted an update to this requirement and staff appreciate the progress. However, staff notes it possible that a vinyl surface and a hardwood surface will produce two different impact responses – the hardwood surface is likely to absorb

more energy than the vinyl surface – though staff are unsure if the difference is meaningful. If the subcommittee would like to explore allowing a hardwood surface for toy testing, staff would recommend further testing by subcommittee members to ensure no reduction in safety.

4. Impact Test

The NPR recommends that battery compartment enclosure doors or covers on each product be subjected to three impacts of at least 2-J (1.5-ft·lbf). The impact is to be produced by dropping or swinging a steel sphere, 50.8 mm (2 in) in diameter, weighing approximately 0.5 kg (1.1 lb). The sphere must strike the battery compartment door or cover perpendicular to the surface of the battery compartment enclosure. This test addresses the hazard of impacts directly on the battery compartment, which can occur when two products are impacted together or when a product is slammed against another surface. This type of impact can occur during play, and can result in battery compartments opening unintentionally.

ASTM F963 does not address this particular hazard, but UL 4200A, IEC 62368-1, and IEC 62115 address the hazard to varying degrees. Staff determined through testing of products containing button cell or coin batteries that three impacts of 2-J (1.5-ft·lbf) were adequate to test the durability of those products. Staff asks the subcommittee to consider a similar test requirement for toys containing button cell or coin batteries, to reduce the risk of battery compartments opening unintentionally during play.

5. Crush Test

The NPR recommends a crush test to address the hazard of a consumer's hand or foot compressing the product and causing the battery compartment to open. Each sample is supported by a fixed rigid supporting surface, in positions likely to produce the most adverse results as long as the position of the consumer product is self-supported. The tester then applies a crushing force of at least 335 N (75.3 lbf) to the exposed surface for a period of 10 seconds. The force is applied using a flat surface measuring approximately 100 by 250 mm (3.9 by 9.8 in).

Staff determined the compression test in ASTM F963, which applies a lesser force than the recommended crush test over a smaller surface, addresses a different hazard than the crush test. Because the crush hazard is not specifically addressed by ASTM F963, staff asks the subcommittee to consider adding a test similar to that described in the NPR.

6. Accessibility Probe Compliance Test

The NPR proposes an additional test after abuse testing to verify the security of the battery compartment and would require application of a force of 50 N (11.2 lbf) for 10 seconds to the battery compartment enclosure door or cover using Test Probe 11 in IEC 61032 Protection of Persons and Equipment by Enclosures – Probes for Verification. The tester would then apply the accessibility probe at the most unfavorable position on the battery compartment enclosure, and in the most unfavorable direction, in only one direction at a time. If the battery compartment enclosure door or cover opens or does not remain functional, or the button cell or coin battery becomes accessible, the consumer product is non-compliant and fails testing. The NPR requests comment on whether this probe is adequate to verify accessibility of a button cell or coin battery in a battery compartment.

ASTM F963 uses two articulating accessibility probes, based on 16 CFR 1500.48 and 16 CFR 1500.49, which are not practical for tests applying forces greater than those specified in the CFR. Additionally, while the standard requires that batteries not be accessible before or after durability testing, the method does not provide a specific test to verify that a battery compartment remains secure and functional beyond the use of the accessibility probe. A rigid probe, such as Test Probe 11, can be used to verify both the security and the functionality of a button cell or coin battery compartment enclosure. Staff asks the subcommittee to consider a similar requirement as that proposed in the NPR, to verify that toy battery compartments containing button cell or coin batteries remain secure and functional after durability testing.

7. Securement (non-removable batteries)

Proposed § 1263.3(f) of the NPR (88 Fed. Reg. 8,723) would require a test to ensure the security of accessible button cell or coin batteries that are not intended for removal or replacement. A test hook is used to apply a force of at least 22 N (4.9 lbf) directed outwards, applied for 10 seconds at all points where application of a force is possible. The battery cannot liberate from the product during testing.

The test as described in the NPR would not be applicable to toy products in ASTM F963, because the standard requires that button cell or coin batteries not be accessible without the use of a tool. Therefore, staff do not recommend the subcommittee consider this securement test at this time.

C. Labeling Requirements

The NPR recommends specific warning labels for product packaging and products containing button cell or coin batteries. Examples of those labels are shown below. Staff asks the subcommittee to review the warning label and instructional literature requirements in the NPR, and to consider implementing similar warning label and instructional literature requirements for toy products containing button cell or coin batteries, to address the ingestion hazard.

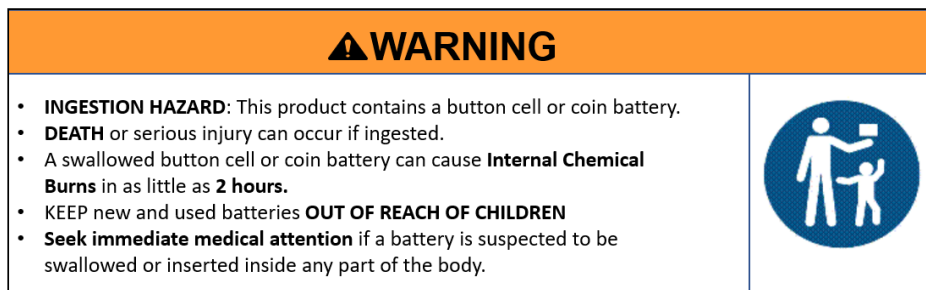


Figure 1. Example Product Packaging Warning Label



Figure 2. Example On-Product Warning Label



Figure 3. Example Alternative On-Product Warning Label

D. Battery Packaging Requirements

Staff emphasizes that, after February 12, 2023, “any button cell or coin battery... included separately with a consumer product sold, offered for sale, manufactured for sale, distributed in commerce, or imported into the United States” is required to utilize packaging that meets the requirements of 16 CFR § 1700.15. This requirement in section 3 of Reese’s Law also applies to toys with button cell or coin batteries included separately with the product (*i.e.*, not pre-installed in the product). Button cell or coin battery packaging compliant with the marking and packaging provisions of ANSI C18.3M is not subject to the special packaging requirements in section 3 of Reese’s Law. More information can be found on the CPSC [Button Cell and Coin Battery Business Guidance](#) website.⁴

Staff appreciates the work of the ASTM toy subcommittee to address hazards associated with toys, and looks forward to working with the subcommittee to address hazards associated with products containing button cell or coin batteries. Staff expects to submit a final rule briefing package to the Commission this summer addressing non-toy products, per Reese’s Law. If you have any questions, or need additional information, you can contact us at: dtaxier@cpsc.gov, (301) 987-2211; or bmordecai@cpsc.gov, or (301) 987-2506.

Sincerely,

Daniel Taxier

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Jacqueline Campbell, CPSC Voluntary Standards Coordinator

⁴ <https://www.cpsc.gov/Business--Manufacturing/Business-Education/Business-Guidance/Button-Cell-and-Coin-Battery>