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LOG OF MEETING
DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: Meeting of ASTM Work Group on Battery-Powered Ride-On Toys to discuss proposed requirements for F963, Standard for Toy Safety

DATE OF MEETING: November 11, 1999

PLACE OF MEETING: Toy Manufacturers of America, Inc., 1115 Broadway, New York, NY 10010

LOG ENTRY SOURCE: Doug Lee, ESEE

DATE OF LOG ENTRY: November 23, 1999

COMMISSION ATTENDEES: Doug Lee, ESEE

NON-COMMISSION ATTENDEES:

Lindsay Harris, Committee Chairman, Fisher-Price
Joan Lawrence, Toy Manufacturers of America
Wolfgang Casta, Hedstrom Corporation
Rick Locker, Locker, Greenberg & Brainin
Timothy Harris, Peg Perego
Robert Coughlin, Fisher-Price
Roland Riegel, Underwriters Laboratories Inc.
Michael Babiak, Energizer

SUMMARY OF MEETING:

Mr. Harris opened the meeting by addressing the Commission's technical staff request for including requirements for battery powered ride-on toys in the voluntary Standard Consumer Safety Specification on Toy Safety, ASTM F963. Mr. Lee stated that the Commission's technical staff originally proposed design based requirements for the standard but would not be opposed to performance based requirements if they adequately address hazards.

Mr. Harris introduced the Fisher-Price based proposals that would serve as the starting point for discussions. The original proposals were previously commented on by the Commission's technical staff. The scope was discussed in detail. The committee agreed that the scope should include all battery powered ride-on toys that have the capacity to deliver 8 amperes into a resistor for 1 minute. The intent was to include all lead-acid type batteries that could deliver 48 watts of power. Class II Power Units, UL 1310 was cited as the rationale for determining the risk of a fire hazard.

The remaining requirements were briefly discussed to introduce and clarify the requirements to the other committee members. The committee will reconvene after the manufacturers have had

an opportunity to determine baseline loading conditions. The baseline proposals are appended to the meeting log.

September 1, 1999

Mr. Tony Ferraro
Associate Vice-President
Product Safety and Quality Assurance
Hasbro Manufacturing Services
Northeast Division
P.O. Box 1247
East Longmeadow, MA 01028-5247

Dear Mr. Ferraro,

As a member of the ASTM 15.22 Work Group on Battery Operated Toys, I received a copy of the July 12, 1999 letter from Mr. Douglas A. Lee of the Consumer Product Safety Commission to Mr. David Miller, Chairman of the ASTM F15.22 Subcommittee. .The subject of the letter was a CPSC proposal for tests for battery powered ride-on toys for inclusion in the Standard Consumer Safety Specification on Toy Safety, ASTM F963. Since you serve as the chairman of the work group, I am submitting comments from Fisher-Price concerning the CPSC proposal.

Attached is a copy of Mr. Lee's proposal with the Fisher-Price revisions in bold lettering. Please call me at (716) 687-3984 if I can be of any assistance in this matter.

Sincerely,

Robert J. Coughlin

cc: Joan Lawrence, TMA
John Preston, Chief Engineer, US CPSC

CPSC REVISED PROPOSED TESTS FOR BATTERY POWERED RIDE-ON TOYS

FISHER-PRICE COMMENTS

Following are CPSC staff suggested performance requirements for battery operated ride-on toys that are based on a previous proposal submitted by Fisher-Price.

1. Scope. These requirements cover ride-on toys using a battery as the power source where:

    a. The battery open circuit voltage is less than 30 VDC and the battery can deliver 8A or more for 1 minute of operation, or
    b. The battery can deliver 15 watts or more for at least 1 minute into an external resistor connected to the battery terminals.

2. Test Conditions: Components tested in accordance with the following requirements are to be installed and operated in the toy as they would be during normal use unless otherwise specified. ***Testing is to be conducted while the vehicle is operated on a level, brushed concrete surface. Power the toy using a fully charged battery as recommended by the manufacturer. Unless otherwise specified, ambient temperatures must be 20° C ± 5° C.***

    Rationale: Brushed concrete was chosen for consistency in lab testing. Testing should be conducted using the battery designed for use with the vehicle and provided by or recommended by the manufacturer. An ambient temperature for the testing environment should be specified.

3. Normal Operation Test: Physically load the vehicle with a weight that is equivalent to the weight of the highest age child in the age range for which the toy is intended (see Table 3 of ASTM F963) using a fully charged battery. ***If no upper age limit is specified, load the vehicle with a weight equal to the weight limit specified by the manufacturer. If no upper age limit is specified and the manufacturer does not specify a maximum weight limit, use the maximum weight specified in table 3 of ASTM F963 per occupant.*** Operate the vehicle under normal use conditions cycling the motor ____ seconds "on" and ____ seconds "off" until the battery is exhausted. The maximum temperature measured on the insulation of any conductor may not exceed the temperature rating of the material. If the rating of the material cannot be determined, the rise in temperature shall not exceed 63°F (35°C). There must be no degradation of electrical insulation.

    Rationale: Frequently, manufacturers do not specify upper age grades. It is common practice to display the age grade of some toys in the format "x years and up". Maximum weight limits specified by the manufacturer should be considered.

4. Overload Test: Overload the vehicle by adding weight not exceeding the weight limits described in Section 4.17.5 of ASTM F963. Make several trial tests to determine the load which results in maximum heating. ~~***Using a power source capable of supplying the equivalent battery peak and run currents***~~ Operate the vehicle continuously until ***the battery is exhausted or until thermal*** equilibrium is obtained for X minutes. The maximum temperature measured on the insulation of any conductor may not exceed the temperature rating of the material. If the rating of the material cannot be determined, the rise in temperature shall not exceed 63°F (35°C). There must be no degradation of electrical insulation.

   Rationale: Operation using an external power supply does not represent "normal use" as defined by the standard.

5. Stalled Motor Test: Stall the motor until two fully charged batteries are exhausted. The maximum temperature measured on the insulation of any conductor may not exceed the temperature rating of the material. If the rating of the material cannot be determined, the rise in temperature shall not exceed 63°F (35°C). There must be no degradation of electrical insulation. If the overcurrent device is accessible to the consumer, then the device shall be bypassed in running the stalled motor test.

6. Switch Endurance and Overload Test: Condition switches as follows before Endurance and Overload Tests:

   a. Salt Spray Conditioning – Condition switches for a period of 48 hours using a 5% by weight salt solution.
   b. Humidity Conditioning – Condition switches at 104°F (40°C), 95% relative humidity for a period of 48 hours.
   c. Thermal Cycling Conditioning – Condition switches for 10 cycles of operation between 14 and 120°F (-10 and 49°C). Evaluate switch at both temperature extremes.

   Endurance Test – Cycle a switch ~~***for accessories (e.g. lights, horn, radio, cell phone)***~~ as described in the Normal Use Test for 6,000 cycles of operation. If a switch is relied upon ~~***for safe operation (e.g. foot pedal, high/low, forward/reverse)***~~ ***to make and break the motor circuit,*** conduct the endurance test for 100,000 cycles. The switch contacts must not weld during the test. ***The temperatures measured on the body of the switch shall not exceed the temperature rating of the material.*** The switch body shall not degrade to result in short circuit conditions. ~~***The temperature rise on the wiring terminals or on the wire leads shall not exceed 54°F (30°C).***~~

   Rationale: Switches which make and break the motor circuit should be subjected to the 100,000 cycle test. All other switches should be subjected to 6,000 cycles of operation. The UL 1054 temperature rise specified is a benchmark limit for evaluating component switches that are not subjected to the environmental conditions specified. The temperature limits after environmental conditioning and testing should be based on material properties and limits.

Overload Test – Stall the motor of the toy. Operate the switch for 50 cycles at a rate not exceeding 6 cycles per minute. The switch contacts must not weld during the test. ***The temperatures measured on the body of the switch shall not exceed the temperature rating of the material.*** The switch body shall not degrade to result in short circuit conditions. ~~***The temperature rise on the wiring terminals or on the wire leads shall not exceed 54°F (30°C).***~~

> ***Rationale: The UL 1054 temperature rise specified is a benchmark limit for evaluating component switches that are not subjected to the environmental conditions specified. The temperature limits after environmental conditioning and testing should be based on material properties and limits.***

7. Electrical Pressure Connection Test: This applies to electrical pressure connectors which involve consumer assembly or replacement. Condition the pressure connection before testing. Condition user replaceable fuses by removing and inserting the fuse for ***50*** _____ cycles of operation. Condition connectors required for charging ***or discharging*** the battery by disconnecting and connecting for ***3000*** _____ cycles. Operate the vehicle under normal use conditions cycling the motor for ____ seconds "on" and ____ seconds "off" until the battery is exhausted. The maximum temperature rise measured on the electrical insulating material in contact with the connection shall not exceed the temperature rating of the material and there must be no degradation of electrical insulation.

> ***Rationale: The number of cycles should be based on a reasonable maximum number of cycles associated with vehicle life. The numbers specified exceed the number of use cycles during normal vehicle life. The test should consider battery, charger and harness connectors.***

8. User Replacement Markings: The toy must be marked with the rating of a user replaceable protective device. The marking must be adjacent to the protective device.

The following are new proposals:

9. High Ambient Testing:

   a. Complete two cycles of the Normal Operating Test at 120°F (49°C) ambient using two fully charged batteries.
   b. Complete 25 cycles of the ~~***Stalled Motor***~~ ***Overload*** Test at 120°F (49°C) ambient.

   The maximum temperature measured on the insulation of any conductor may not exceed the temperature rating of the material. If the rating of the material cannot be determined, the rise in temperature shall not exceed 63°F (35°C). There must be no degradation of electrical insulation.

> ***Rationale: The stalled motor test reference may be incorrect. The stalled motor test described in part 5 is not a cycling test.***

~~10. Vehicle Body: Polymeric materials used to support or enclose electrical parts shall be 94V rated or pass end product flame tests (UL 746C).~~

***Rationale:** The need for the redundancy offered by 94V rated materials for toys which will meet the safety requirements of the standard, needs further discussion. The European standard for the Safety of Electric Toys, EN50088, covers "high power" electric toys capable of greater than 15 Watts. The precedent has been set to apply requirements for resistance to heat and fire to toys exceeding 12 volts and 3 amps only.*

11. Battery Charger: The battery charger shall be certified to the appropriate charger standard (such as UL 1310, CSA ____, IEC ____). A fault in the charger or charger wires shall not cause the battery to feed the fault and become a risk of fire.

12. Accessory Wiring: Wiring for accessories connected to the main/motor battery shall be short circuit protected.

13. Battery Connectors: Battery connectors shall be 94V rated. Battery connectors that are mated and unmated for charging shall be 94V-0 rated.

14. Fuse Short Circuit Test: A fuse shall interrupt a short circuit test with a fully charged battery without presenting a risk of fire.

15. Strain Relief: Strain relief shall be provided so that mechanical stress on a flexible cord will not be transmitted to terminals, splices, or interior wiring.

16. Switches: Switches enclosures or supports of current carrying parts shall be 94V rated. Other switch parts shall be 94HB rated.