X 8/3/94

ESDOC 553197

LOG OF MEETING

DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: 5 Gallon Open Head Containers (Buckets)
ASTM Subcommittee F15.31
Performance Task Group Meeting

DATE OF MEETING: July 20, 1994

PLACE: Hilton Hotel
O'Hare Airport
Chicago, IL

LOG ENTRY SOURCE: George F. Sushinsky, ESEL

DATE OF ENTRY: July 26, 1994

COMMISSION ATTENDEES:
George Sushinsky, ESEL

NON-COMMISSION ATTENDEES:
William H. Roper, Chairman and CEO, Ropak Corporation
Ed Rowe, G.K.M. Inc, Davies Can Co.
Charlie Byers, Manager, Product Safety, U. S. Gypsum Corp.
John W. Von Holdt Sr., Chairman, Plas-Tool Co.

SUMMARY OF MEETING:

The meeting convened at 10:00 a. m. with Mr. Roper, Mr. Rowe and Mr. Sushinsky in attendance. The first topic for discussion concerned the stability criteria in the draft ASTM standard. The issue at hand was the rationale for the F_H and F_V limits and whether the passing criteria included meeting either or both horizontal and vertical stability limits. Mr. Sushinsky explained the rationale for the development of the horizontal and vertical force limits. In addition, he explained that the criteria for horizontal stability was a "qualifier" intended to maintain low stability limits for current buckets. The vertical stability limit was the new criteria that an "unstable" bucket would need to meet. It was the feeling of Mr. Roper and Mr. Rowe. that this requirement as drafted could not be met and still fulfill the bucket customers' needs. Therefore, the stability option was eliminated as a possible area of bucket performance.

Mr. Sushinsky discussed some of the considerations that went into the development of the draft ASTM standard. To address the drowning hazard a bucket needed to:

* tip when a small child leaned into it; or
* prevent a small child from falling into it; or
* be exempted from the performance requirements, for example by design such as a leaky bucket, or by absence of availability for secondary consumer use i.e. buckets recycled back to the source.

The performance category, to prevent a small child's access to the contents of a bucket, was discussed next. The primary means considered to prevent access was a restrictor. The task force members generally agreed that an external restrictor would not be a suitable solution to the drowning problem because it could be removed relatively easily. An internal-type restrictor (deemed as the "angel cake" type) seemed to offer a possible solution. If properly designed, an internal restrictor could keep a child from access to liquid in the bucket and/or prevent the child's center of gravity from entering the bucket thus allowing the child to fall out of the bucket. Mr. Byers joined the meeting at this point and discussed some of the potential effects an internal post could have on the end user, including the inability to mix a multicomponent product such as paint. Mr. Roper and Mr. Rowe offered to further examine the design and manufacturing issues involved in molding buckets with internal restrictors.

Mr. Roper handed out another draft standard to the task force (attachment 1). Mr. Roper asked for comments on a new section 6.4, Cover Retention Performance. This requirement is intended to test the ease of removal for a bucket lid. The appropriateness of this requirement was not evaluated. Changes to the drafted requirements included changing the test temperature to room temperature as a worse case condition.

After lunch, Mr. Von Holdt arrived and handed out a letter with an idea for child-proofing 5-gallon buckets. (See attachment 2.) Mr. Von Holdt proposes that buckets be molded with a serrated type pattern intended to deter a child from holding onto or grabbing the bucket's rim. The pattern will be designed to prevent a child from sliding over the edge into the bucket by either deterring the child from approaching the bucket or catching on the child's clothes as the child leans into the bucket. Mr. Von Holdt explained that the protection feature is automatic, requiring no outside agent and is readily transferred to the current manufacturing process. He stated that a prototype mold was in development. Mr. Roper asked Mr. Von Holdt to send samples to the task force for examination.

At this point the discussion turned to consideration of the dimensional scope of the standard. At the last task force meeting, it was decided that linear dimensions and not volume would be a better descriptor of the buckets under evaluation. Mr. Sushinsky presented the Human Factors finding, based on anthropometric considerations, that buckets with heights between 12 and 21 inches and buckets with diameters over 7 inches presented a drowning risk to small children. Mr. Sushinsky further explained that the lower height dimension (12 inches) needed further study of other than anthropometric considerations to become a final CPSC staff recommendation. Mr. Roper noted that taller buckets with a handle were impractical for shorter people to carry. A discussion ensued on the impact to industry if all future 5-gallon buckets were 12 inches or less in height. Mr. Roper allowed that it could be done but that the lead time was at least three years because of the limited number of mold makers available. Mr. Byers discussed the impact on filling and shipping shorter buckets.

Mr. Roper asked "what if" implemented changes did not show a significant decrease in the hazard after a number of years, would the commission allow the industry time to use any new investments to the end of their useful lives? Mr. Sushinsky suggested that the issues (lead times, useful life, shipping changes) should be addressed in detail in a response to the ANPR.

Mr. Roper and Mr. Sushinsky revisited the topic of recycling. The issue that needs resolution is the percentage of recycled buckets necessary to achieve an effective recycling rate of at least 80 percent. Other topics were similarly revisited including (1) buckets without handles, (2) labeling as a performance alternative, (3) performance as a labeling alternative, and (4) I&E campaigns.

No task group meetings were scheduled prior to the next subcommittee meeting on September 21, 1994, in Washington DC. The meeting adjourned at 3:50 p.m.

ATTACHMENT 1

3. TERMINOLOGY

3.1 *5-Gallon Containers, n* - for the purpose of this standard, a straight sided vessel having a top opening between opposing sides or, if round, its diameter of not more than ___ inches nor less than ___ inches, a height greater than 10 inches (254 mm) but not over 20 inches (508 mm), designed to be carried by hand and to be used to transport liquids or solids.

3.2 *Straight-Sided Vessel, n* - for the purpose of this standard, a container having straight sides which may taper at an angle not exceeding five degrees outwardly from the true vertical position.

3.6 DELETE

6. TEST PROCEDURES

6.1 STABILITY PERFORMANCE shall be determined by either the calculation procedure of 6.1.1 or the test procedures in 6.1.2.

6.1.1 Stability Performance Calculations

6.1.1.1 Horizontal Stability

$$F_H = [(F_1) \times (R)]/[H]$$

where:

F_{11} = the horizontal tipping force,
F_1 = the combined weight of the water and the container,
F_B = One-half distance along the major lateral dimension of the bottom of the container (e.g. the radius of a circular container or one-half the distance between the widest spaced opposing sides of a non-round container), and
H = the height of the container

6.1.1.2 Vertical Stability

$$F_V = [(F_1) \times (R_B)]/[R_T - R_B]$$

where:

F_V = the vertical tipping force.
F_1 = the combined weight of the water and the container,
R_T = One-half distance along the major lateral dimension of the top of the container (e.g. the radius of a circular container, or one-half the distance between the widest spaced opposing sides of a non-round container),
R_B = One-half distance along the major lateral dimension of the bottom of the container (e.g. radius of a circular container, or one-half the distance between the widest spaced opposing sides of a non-round container), and
H = the height of the container.

6.1.2.1.1.1 The sample containing water to 40 percent of its inside height ±⅛ inch.

6.1.2.1.1.3 Force Measurement: Device capable of measuring force with an accuracy of ±1.1N (0.2 lbf).

6.1.2.1.2 Test Procedure:

6.1.2.1.2.1 Apply horizontal force to top chime of sample radially outwards as applies against the uppermost inside part of the sidewall in an attempt to pull the sample over. The point of application of the force shall be at the uppermost inside central part of the sidewall panel or, if round, at any uppermost inside part of the circumference. Maintain the direction of the force within ± 5 degrees of horizontal as the test sample tips.

6.1.2.2.1 Apparatus

6.1.2.2.1.1 The sample containing water to 40 percent of is inside height ± ⅛ inch.

6.1.2.2.1.3 Force Measurement: Machine capable of measuring force with an accuracy of ± 5.0N (1.1 lbf). This machine shall be capable of applying the maximum load in a true vertical direction (± 1 degree) and allow relative lateral movement of the top and bottom of the test sample.

6.1.2.2.2 Test Procedure

6.1.2.2.2.1 Apply a vertical force to the top of sample, including any protrusion that encircles the sample within 25 mm of the upper chime of the sample. The point of application of the force shall be in the center of one of the sidewall panels or, if round, at any point on the circumference. Maintain the direction of the applied force within ± 1 degree of vertical as the test sample tips.

6.2.1.2 Test sample containing water to 40 percent of its inside height ± ⅛ inch.

6.3.1.2 Force Application Device - capable of applying and measuring both a tensile or compression force with an accuracy of ±5.0N (1.1 lbf) applied perpendicularly to the restrictor.

6.4 Cover Retention Performance

6.4.1 Apparatus

6.4.1.1 Test sample containing a mixture of water and ethylene glycol that remains liquid at 0°F filled to within ½ inch of underside of installed cover.

6.4.1.2 A cover for the test sample that has no means for facilitating its removal when installed on the test sample.

6.4.1.3 Drop test device used in a manner that will drop a test sample onto solid concrete or equivalent with an accuracy of ±one inch.

6.4.1.4 Freezer

6.4.2 Test Procedure

6.4.2.1 Precondition the test sample with cover in place filled with contents for a minimum of 4 hours after test sample and contents have reached 0°F.

6.4.2.2 Drop the test sample from a height of 48 inches oriented so that the sample strikes the concrete on its flat side but not on a bail attachment ear.

7.1 Class 1

All specimens must tip when subjected to a static horizontal force of 20 N (4.5 lbf) or less, and/or tip when subjected to a static vertical force of 62 N (14 lbf) or less.

7.2 Class 2

7.2.3 DELETE

7.3 Class 3

All specimens tested by procedure 6.4 shall retain their cover solidly in place without any signs of the cover becoming disengaged. No continuing leakage shall occur.

Children can drown in buckets containing more than 152 mm of liquid. However, the performance requirements in 7.1 relates to the use of the mass of a 5th percentile 6-8 month old infant (6.4 kg). This provides a conservative safety factor that would be comparable to using the average weight infant (10 kg) with a bucket containing 220 mm (9 inches) of water.

ITEM /

Document X-15.31-13
1/1/94

Designation E________-94

EMERGENCY STANDARD FOR SAFETY PERFORMANCE REQUIREMENTS FOR FIVE GALLON CONTAINERS (BUCKETS)[1]

This standard is issued under the fixed designation E___ ___, the number immediately following the designation indicates the year of original adoption or, in the case of revision the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. SCOPE

1.1 This standard is intended to reduce the potential of infant drownings in "5" (4 - 6.0) gallon containers.

1.2 This standard outlines performance requirements for stability, , accessibility, liquid retention, photo-degradability, cleanability or recyclability.

1.3 Containers are classified in one of six ways.

1.4 It is not the intent of this specification to include other performance requirements such as those set forth by the Environmental Protection Agency or Department of Transportation or other applicable regulations and standards.

2. REFERENCED DOCUMENT

ASTM D618 Standard Methods of Conditioning Plastics and Electrical Insulating Materials for Testing,

ASTM D1435 Practice for Outdoor Weathering of Plastics

ASTM D3826 Practice for Determining Degradation End Point in Degradable Polyolefins Using a Tensile Test

ASTM E____-93 Emergency Standard Specification of Cautionary Labeling for Five Gallon Plastic Containers (Buckets)

Note: See Appendix B for additional references.

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[1] This standard is under the jurisdiction of ASTM Committee F-15 on Consumer Products and is the direct responsibility of Subcommittee F15.31 on Open Head Containers.

3UU. 3

TOP OPENING BETWEEN OPPOSING SIDES OK, IF ROUND, ITS DIAMETER OF NOT MORE THAN ___ INCHES NOR LESS THAN ___ INCHES

3. TERMINOLOGY

(A)

3.1 ~~5-~~*Gallon Containers*, n - for the purpose of this standard, a straight sided vessel having a ~~capacity of 4 gallons (15.1 L) or more to 6.0 gallons (22.4 L) or less, having an opening at the top,~~ height greater than 10 inches (254 mm) but not over 20 inches (508 mm), ~~and~~ designed to be carried by hand and to be used to transport liquids or solids.

3.2 *Straight-Sided Vessel*, n - for the purpose of this standard, ~~a~~ container having straight sides which may ~~or may not~~ taper ~~inward or~~ outward from the true vertical position. AT AN ANGLE NOT EXCEEDING FIVE DEGREES

3.3 *Restricted Opening*, n - for the purpose of this standard, an opening at the top of a container having less than a full diameter opening at the top meeting the requirements of 6.2 of this standard.

3.4 *External Restrictor*, n - for the purpose of this standard, a restrictor intended to prevent a child's head from entering the bucket.

3.5 *Internal Restrictor*, n - for the purpose of this standard, a restrictor intended to prevent a child's head from being immersed in the liquid contents of a bucket.

3.6 *Capacity*, n - for ~~the~~ purpose of ~~this standard~~, the capacity as ~~measured with~~ the container filled to ~~the top~~.

4. CLASSIFICATION

4.1 Container shall meet at least one of the following classifications:

4.1.1 Class 1: container meeting the stability performance requirements in 7.1 when tested according to 6.1.

4.1.2 Class 2: container meeting the accessibility performance requirements of 7.2 when tested according to 6.2 and 6.3 .

4.1.3 Class 3: container meeting the liquid retention performance requirements of 7.3 when tested according to 6.4.

4.1.4 Class 4: container meeting the material photo-degradation requirements of 7.4 when tested according to 6.5.

4.1.5 Class 5: containers meeting the cleanability performance requirements of 7.5 when tested according to 6.6.

4.1.6 Class 6: containers meeting the recycling requirements of 7.6.

5. CONDITIONS

5.1 Unless otherwise specified, all specimens and contents are to be conditioned for at least 24 hours in Standard Laboratory Atmosphere as defined in ASTM Method D618 (i.e., 25 ± 2°C and 50 ± 5% relative humidity) and all tests performed in the same standard conditions.

6. TEST PROCEDURES

6.1 Stability performance shall be determined by either the calculation procedure of 6.1.1 or the test procedures in 6.1.2.

CAPS

6.1.1 Stability Performance Calculations

6.1.1.1 Horizontal Stability

$$F_H = [(F_1) \times (R_B)]/[H]$$

where:

F_H = the horizontal tipping force,
F_1 = the combined weight of the water and the container,
R_B = One-half distance along the major lateral dimension of the bottom of the container (e.g. the radius of a circular container, one-half the distance between the widest spaced ~~parallel~~ sides of a container ~~with a polygonally-shaped cross-section~~), and
H = the height of the container.

OR OPPOSING NON-ROUND

6.1.1.2 Vertical Stability

$$F_V = [(F_1) \times (R_B)]/[R_T - R_B]$$

where:

F_H = the ~~horizontal~~ tipping force,
F_1 = the combined weight of the water and the container,
R_T = One-half distance along the major lateral dimension of the top of the container (e.g. the radius of a circular container, one-half the distance between the widest spaced ~~parallel~~ sides of a container ~~with a polygonally-shaped cross-section~~),
R_B = One-half distance along the major lateral dimension of the bottom of the container (e.g. the radius of a circular container, one-half the distance between the widest spaced ~~parallel~~ sides of a container ~~with a polygonally-shaped cross-section~~), and
H = the height of the container.

VERTICAL F_V OR OPPOSING NON-ROUND OR OPPOSING NON-ROUND

MAJOR DISTANCE BETWEEN TWO OPPOSING SIDES

RADIALLY OUTWARDS AS APPLIED AGAINST THE UPPERMOST INSIDE PART OF THE SIDEWALL IN AN

6.1.2 Stability Performance:

6.1.2.1 Horizontal Stability

6.1.2.1.1 Apparatus

6.1.2.1.1.1 The sample containing water to 40 percent of its ~~capacity~~. INSIDE HEIGHT ± 1/8 INCH.

6.1.2.1.1.2 Testing Surface: The test surface shall be sufficiently non-slip that the test sample (with water) will not slide during the test.

6.1.2.1.1.3 Force Measurement: Device capable of measuring force ~~up to 110N (25 lbf)~~ with an accuracy of ± 1.1N (0.2 lbf).

6.1.2.1.2 Test Procedure:

6.1.2.1.2.1 Apply horizontal force to top chime of sample ~~in a direction that would~~ attempt to pull the sample over. ~~The direction of the force shall be applied in a direction along the major lateral dimension (diameter for circular containers) as measured between parallel sides of the top chime~~. The point of application of the force shall be ~~in the center of one of the parallel sides~~. Maintain the direction of the force within ± 5 degrees of horizontal as the test sample ~~tips~~.

6.1.2.1.2.2 Record the maximum horizontal force necessary to tip the sample from the original position.

AT THE UPPERMOST INSIDE CENTER PART OF THE SIDEWALL PANEL

6.1.2.2 Stability Performance - Vertical Stability

6.1.2.2.1 Apparatus

6.1.2.2.1.1 The sample containing water to 40 percent of its ~~capacity~~. INSIDE HEIGHT ± 1/8 INCH.

6.1.2.2.1.2 Testing Surface: The test surface shall be of low friction (mu < 0.1) such that the test sample (with water) will tip under the test load applied by means of the test machine described in 6.3.2.1.3.

6.1.2.2.1.3 Force Measurement: Machine capable of measuring force ~~up to 500N (112 lbf)~~ with an accuracy of ±5.0N (1.1 lbf). This machine shall be capable of applying the maximum load in a true vertical direction (± 1 degree) and allow relative lateral movement of the top and bottom of the test sample.

OR, IF ROUND, AT ANY UPPERMOST INSIDE PART OF THE CIRCUMFERENCE ~~RADIAL EXTENSION FROM THE CENTER~~

6.1.2.2.2 Test Procedure

6.1.2.2.2.1 Apply a vertical force to the top of sample, including any protrusion that encircles the sample within 25 mm of the upper chime of the sample. ~~The direction of the force shall be applied in a direction perpendicular to the major lateral dimension (diameter for circular containers) as measured between parallel sides of the top chime~~. The point of application of the force shall be in the center of one of the ~~parallel sides~~ SIDEWALL PANELS OR, IF ROUND, AT ANY POINT ON THE CIRCUMFERENCE. Maintain the direction of the applied force within ± 1 degree of vertical as the test sample tips.

6.1.2.2.2.2 Record the maximum vertical force to tip sample from the initial position.

6.2 Accessibility Performance

6.2.1 Apparatus

6.2.1.1 Head Penetration Probe - Template representing the head of a 6-8 month old, 5th percentile child should be an ellipse with dimensions 143 by 111 mm (5.6 x 4.4 inches). The probe should be 74 mm (2.9 inches) thick.

6.2.1.2 Test sample containing water to 40 percent of ~~capacity~~ ITS INSIDE HEIGHT ± 1/8 INCH.

6.2.2 Test Procedure for container with a restrictor

6.2.2.1 With the container standing upright, move the test probe into contact with the restrictor, keeping the base horizontal.

6.2.2.2 While keeping the base of the probe horizontal, determine if the head probe can be pushed past the restrictor by a force no greater than 270 N (60 lbf).

6.2.2.2.1 For a container with an internal restrictor, note to what extent (if any) the probe enters the water.

6.2.2.2.2 For a container with an external restrictor, note if the probe penetrated the restricted opening.

6.3 Restrictor Durability Performance

6.3.1 Apparatus

6.3.1.1 Test sample

6.3.1.2 Force Application Device - capable of applying and measuring both a tensile or compressive force ~~of 890 N (200 lbf)~~ applied perpendicularly to the restrictor WITH AN ACCURACY OF ± 5.0 N (1.1 lbf).

6.3.2 Test Procedure - Restrictor retention

6.3.2.1 Apply a tensile force of 880 N (200 lbf) at a point on the restrictor providing the greatest moment for removing or fracturing the restrictor.

6.3.2.2 Apply a compressive force of 880 N (200 lbf) at a point on the restrictor providing the greatest moment for fracturing the restrictor.

6.3.2.3 Apply a torque of 270 N-m (200 lbf-ft) at a point on the restrictor providing the greatest moment for removing or fracturing the restrictor.

6.3.2.4 Apply an impact force of 270 Joules (200 ft-lbf).

6.4 Liquid Retention Performance

6.4.1 Apparatus

6.4.1.1 Test sample.

6.4.1.2 Source of water.

6.4.2 Test Procedure

6.4.2.1 Place the sample in normal upright position.

6.4.2.2 Begin adding water to the sample, stopping when the sample is full.

6.4.2.3 Measure time required for the water to flow out of the sample.

6.5 Material Photo-Degradation Performance

6.5.1 Apparatus

6.5.1.1 Test sample.

6.5.1.2 Equipment as outlined in ASTM Standards D1435 and D3826.

6.5.2 Test Procedure

6.5.2.1 Cut five 1/2" wide (12.2 mm) test strips from the test sample and expose these 5 strips to outdoor conditions for six months as outlined in D1435.

6.5.2.2 Measure photo-degradation using the test procedure as outlined in ASTM D3826 using the value of greater than 95% reduction in tensile properties.

6.6 <u>Cleanability Performance</u>

6.6.1 <u>Apparatus</u>

6.6.1.1 Test sample - filled for normal shipment

6.6.1.2 Steel wire brush

6.6.1.3 Clorox Bleach

6.6.1.4 Mineral Spirits

6.6.1.5 Standard 5/8" water hose with nozzle

6.6.1.6 Product removal tool

6.6.2 <u>Test Procedure</u>

6.6.2.1 The test shall be performed both immediately after residual product has been removed from the container and one day after residual product has been removed from the container.

6.6.2.2 The majority of residual product shall be removed from the container with a commonly available household tool such as a spatula, paint scraper, putty knife, etc..

6.6.2.3 Clean the sidewalls and bottom of the container for a period of 20 minutes using 1 pint of a solvent such as mineral spirits or other clean-up solvent recommended by the manufacturer for removing product from tools. Steel wire brush shall be used to facilitate cleaning.

6.6.2.4 Remove and discard the spent solvent in accordance with all local, state and federal regulations

6.6.2.5 Rinse the inside of the test container with tap water. Rerinse.

6.6.2.6 Add 7.6 L (2 gallons) of water at 38 ± 1 °C (100 ± 2 °F) to the container.

6.6.2.7 Add 0.35 L (12 ounces) of bleach and mix thoroughly.

6.6.2.8 Let contents of the container soak for 5 minutes.

6.6.2.9 Vigorously scrub the sidewalls and bottom of the container using a wire brush for 15 minutes or until clean.

6.6.2.10 Pour the contents of the container into a separate container and dispose of properly in accordance with all applicable local, state and federal regulations.

6.6.2.11 Spray inside surfaces in a uniform manner with garden hose.

6.6.2.12 Allow the inside of the test container to air dry.

6.6.2.13 Visually inspect the inside of the container.

7.0 PERFORMANCE REQUIREMENTS

7.1 Class 1

AND/OR ?

All specimens must tip when subjected to a static horizontal force of 20 N (4.5 lbf) or less, and shall tip when subjected to a static vertical force of 62 N (14 lbf) or less.

7.2 Class 2

All specimens tested by the test procedures of 6.2 and 6.3 shall meet the criteria if:

7.2.1 For containers with an internal restrictors, when test procedure 6.2 is performed, the head probe shall not be entirely below the water surface. The restrictor shall meet the durability requirements of 6.3 without breaking, unless it breaks in such a way so as to render the sample incapable of containing water.

7.2.2 For containers with external restrictors, when test procedure 6.2 is performed, the head probe shall not penetrate the restricted opening. The restrictor shall meet the durability requirements of 6.3 without breaking, unless it breaks in such a way so as to render the sample incapable of containing water.

7.2.3 For all restrictors, the restrictor shall meet the requirements of 6.3 without breaking, or shall break in such a manner as to render the container incapable of retaining liquid per 6.4.

7.3 Class 3

All specimens shall be tested by test procedure 6.4 and shall meet the criteria if the flow rate is at least 3.8 L/min (1 gal/min) and the remaining liquid level is equal to or less than 50 mm (2 inches).

7.4 Class 4

All specimens tested by test procedure 6.5 shall photodegrade in standardized outdoor conditions in less than 6 months to such an extent as to meet the retention requirement for physical characteristics as outlined in ASTM D3826 of at least 95%.

7.5 Class 5

A specimen shall be tested by test procedure 6.6 and shall meet the criteria if there is no visible sign of residue.

7.6 Class 6

7.6.1 Containers meeting either 7.6.1 or 7.6.2

All containers of a given manufacturer, product code, lot, etc. that are recycled as containers or recycled material back to the class determining source at a return rate of 95 percent or greater.

7.6.2 All containers of a given manufacturer, product code, lot, etc., that are manufactured with a specific knock-out slug of sufficient size to meet the requirements of liquid retention (Class 3) when the slug is removed and in which the slugs are recycled to the class determining source at a return rate 95 percent or greater.

7.6.3 A specific and definitive system shall be devised and demonstrated with proper records maintained to provide means to evaluate and prove conformance to sections 7.6.1 and 7.6.2.

8. KEY WORDS

Buckets, Containers, Safety, Performance

APPENDIX A

SECTIONS

6.1.2.1.1.1 Rationale:

The average fluid height in the investigated incidents was about 152 mm (6 inches) (Scheers, 1993). Over 90% of the investigated incidents involved five gallon buckets. The median height of the five gallon bucket was 355 mm (14 inches). 152 mm is 43% of 355 mm, and since the buckets taper upward, round to 40%. For a standard five gallon bucket, only 112 mm of water are necessary to completely cover the head of an 11 month old child.

Children can drown in buckets containing more than 152 mm of liquid. However, the ~~test procedure~~ in ~~5.1 specifies~~ the use of the mass of a 5th percentile 6-8 month old infant (6.4 kg). This provides a conservative safety factor that would be comparable to using the average weight infant (10 kg) with a bucket containing 220 mm (9 inches) of water.

6.1.2.2.2.2 Rationale:

The general tipping moment about the base of a container consists of moments generated by both horizontal and vertical forces. The geometry of the traditional industrial container (narrow taper, relationship of height, and top and bottom diameters) is such that the tipping effect of a vertical force of similar magnitude. Because of this, it is imperative to maintain the direction of applied forces when trying to measure tipping forces.

Tests using hand held gauges, particularly when used to measure vertical stability, can easily exert inadvertent horizontal loading that results in low and erroneous test results. The use of dead weights to apply a true vertical load may also provide a wrong answer due to the taper of the sample.

Tests using a machine capable of providing a true vertical force can provide consistent and accurate results if case is exercised to ensure that the bottom of the sample is allowed to move as the top of the sample is tipped. If the sample is placed on a flat plate which is on a series of round metal rods (rollers), the resulting vertical tipping forces measured seem to provide adequate agreement with calculated values. Ultimately the calculated values are the easiest to obtain. Test procedures may be preferred for evaluating the stability of unusually designed samples. These test procedures are specified in 6.1.2.

6.2.1.1 Rationale:

For head-first entry into a completely bounded opening, an ellipse is a good approximation for head shape [Deppa, 1989]. The thickness of the probe represents the distance from the top of the head to the nose. (Anthropometry from Snyder, 1977).

6.2.2 Rationale:

The oldest child in the CPSC investigated incidents database was 24 months (Scheers, 1993). The weight of a 95th percentile 19-24 month old child is 13.8 kg (Snyder, 1977). If the full body weight of such a child were applied to the restrictor, a static force of 135 N would be developed (13.8 kg x 9.8 m/s^2). Multiply by a safety factor of 2.

6.3 Rationale:

The force of 880 N (200 lbf) is considered reasonable and may be excessive for consumers to apply in attempts to remove the restrictors.

7.1 Rationale:

Horizontal force: This is the horizontal tipping force measured by CPSC Engineering Sciences staff for 4-6 gallon buckets containing two gallons of water. The buckets are already unstable in terms of horizontal tipping force: this requirement ensures that they are not made any more stable than they currently are. Vertical force: The smallest child at risk (5th percentile 6-8 month old) can exert a static vertical force of 63 N (14.1 lbf) when he applies his full weight to the bucket.

7.3 Rationale:

Drowning can occur in as little as 3 minutes.

7.4 Rationale:

Containers that degrade due to photo exposure conditions in less than 6 months are considered not to be a significant hazard.

7.5 Rationale:

If an open head container a) requires and excessive amount of time and effort to sufficiently remove the primary use product with which the container was filled such that the residual product does not contaminate the liquid used by the household in the secondary use or b) cannot be cleaned sufficiently to enable secondary use without contaminating the liquid, then the container would be considered as undesirable for use in a household (family environment) and would therefore be exempt from further reconfiguration or labeling requirements. If container requires greater than 20 minutes of scrubbing using steel wool and/or a brass wire brush, then the effort necessary to prepare the pail for secondary use would render the container undesirable for use in the household (family environment) and containers holding the tested product would therefore be exempt from further reconfiguration or labeling. We have determined that using more than 1 pint of mineral spirits purchased at a hardware store would exceed the value of the container.

7.6 Rationale:

Containers that are recycled back to the manufacturer do not reach the customer - for subsequent misuse. The same applies if a specified portion of the container is recycled leaving the container in a state that will meet the liquid retention Class of 7.3 (Class 3).

APPENDIX B

ADDITIONAL REFERENCES

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ATTACHMENT 2

PLAS-TOOL COMPANY

7340 N. Croname Road
NILES, IL 60714

Phone: (708) 647-8120
(312) 631-2874
Fax: (708) 647-6925

JULY 20, 1994

To address the problem of a toddler falling into a 5 gallon open head container and drowning, John Von Holdt of Plas-Tool Co. offers one method of prevention that is economical, simple, practical and effective.

Molding a deterring pattern on the top of the container lip that when grabbing the lip with a hand will shock the toddler to withdraw the hand quickly. If the hand is pressed harder against the lip the hand could be slightly marked but not cut, resulting in the toddler crying out, thereby drawing the attention of a nearby party.

Due to the no-skidding feature of this lip pattern, the toddler cannot slide into the bucket when reaching inside to play in a bucket that is partial filled with water. Pressing the body or clothes against the pattern design will also cause the toddler to withdraw in the opposite direction. Child protection would no longer be in the hands of the user but be automatic in the product itself.

Sealing of the container and lid is provided for in this container and lid design.

Modification of existing 3.5,4,5, and 6 gallon open head container molds are possible to convert from the present smooth and slippery lip design to this new restraining ring design. The container lip design will be finalized only after trial and error testing in a toddler playing environment for approval by the Consumer Products Safety Commission.

John Von Holdt
Plas-Tool