Analysis of Fatal Incidents Associated With Window Covering Cords (1996-2002)

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Executive Summary

Staff from the U.S. Consumer Product Safety Commission's (CPSC) Division of Mechanical Engineering (ESME) participated in a data analysis of fatal incidents that occurred between January 1996 and December 2002 involving window covering operating cords. The analysis was conducted by a subcommittee (of which CPSC staff is a participating member) of the Window Covering Manufacturers Association (WCMA) Technical Committee. The subcommittee was formed after CPSC staff expressed concern with the continuing deaths associated with window covering products to the WCMA Technical Committee in November 2002.

The purpose of the data analysis was to identify hazard patterns associated with blind cords, determine product conformance to the current voluntary standard, evaluate the adequacy of the current voluntary standard, and develop possible solutions to the existing hazard patterns.

The leading hazard scenarios associated with window covering products are: 1) strangulation in the continuous loop cord or chain of vertical blinds and draperies, 2) strangulation in a loop formed by a knot tied in horizontal blind lift cords, and 3) strangulation in the inner loop of horizontal blinds.

Approximately 82% of the reported incidents reviewed for this analysis involved older products whose cord configuration did not meet the current voluntary standard requirements. Available information suggests that many of the products were manufactured before voluntary standard requirements became industry action effective.[1]

The current voluntary standard addresses approximately 68% of the reported incidents with requirements for tension devices, inner cord stops, and elimination of loops in operating cords. The requirements for tension devices and inner cord stops rely on active participation of the user to properly install the safety devices. The voluntary standard does not address approximately 27% of the reported incidents where strangulation occurred in a loop that was formed by modification of the cord or in a loop formed by the victim wrapping the cord around his/her neck.

[1] "industry action effective" is a term used to denote industry wide incorporation of a design into production units.

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1. Product Review and Associated Hazard Patterns

Window covering products vary in design and configuration. Typically, a window is covered with a product that opens and closes horizontally or vertically via a system of cords and/or chains. Horizontal type products include horizontal blinds (also known as mini-blinds and venetian blinds), cellular shades, roll-up blinds, roller shades, and Roman shades. Vertical type products include vertical blinds and drapes on a rod or a traverse rod.

Horizontal Blinds

Horizontal blinds consist of a system of slats stacked above a bottom rail that is raised and lowered by lift cords (most common configuration) or by a clutch mechanism operated with a continuous cord loop. Almost all horizontal blinds are operated by a cord lift control system. Prior to 1996, most horizontal blinds were manufactured with lift cords that terminated in a single tassel. The loop formed by the cords ending in a single tassel poses a strangulation hazard when a child places his/her neck in the loop.

The inner cord of a horizontal blind refers to the portion of the lift cord that threads through the horizontal slats and is attached to the bottom rail. When the blind is fully lowered the inner cord can be pulled out from between the slats to form a loop, which poses a strangulation hazard (see Figure 1).

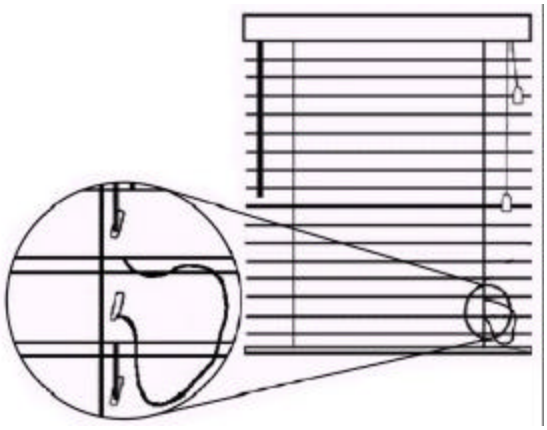

Figure 1. Inner Cord Loop

Cellular Shades

Cellular shades consist of material formed into tubes or cells in a horizontal orientation. The shades are typically operated with a continuous cord loop. If the continuous cord loop is not threaded through an anchored pulley, the free hanging loop poses a strangulation hazard.

Roller Shades

Roller shades consist of material (usually some type of fabric) that is wrapped around a roller. The shades are lowered/raised by a roller mechanism operated by a continuous cord loop control system. A free hanging continuous cord or bead loop poses a strangulation hazard.

Roman Shades

Roman shades consist of a flexible fabric with rings attached to the back. Two or more cords are threaded through the rings and used to raise and lower the shades either with lift cords or a clutch mechanism operated by a continuous cord loop control system. The free hanging loop formed by lift cords that end in a single tassel or the continuous loop control system poses a strangulation hazard.

Vertical Blinds

Vertical blinds consist of slats that hang vertically from a headrail. The slats can be rotated and moved horizontally along the headrail. Both the rotation and traverse movements can be operated by a continuous loop control system. The rotation of the slats is typically operated by a continuous chain and the transverse movement of the slats is typically operated by a continuous loop control system. The free hanging loop in the chain or cord poses a strangulation hazard.

Draperies

Drapery products consist of a fabric window covering that hangs from either a headrail or a rod. A continuous cord loop control system operates the traverse rod in the headrail to open or close the drapes. A free hanging loop in the continuous cord poses a strangulation hazard.

2. The Voluntary Standard

In 1994, CPSC staff was aware of approximately 140 deaths (that had occurred since 1981) associated with the operating cords of window covering products. At that time, staff voiced concerns to the Window Covering Manufacturers Association (WCMA), who agreed to work with CPSC staff to develop a voluntary standard for window covering safety under the American National Standard Institute (ANSI) standards process. This standard was published in 1996 and is designated as ANSI/WCMA A100.1-1996 *American National Standard for Safety of Corded Window Covering Products.* The voluntary standard requires elimination of cord loops and restriction of continuous loops and chains by way of a tension device.

Members of the WCMA also joined with importers and retailers of window covering products to form the Window Covering Safety Council (WCSC) in 1994. The WCSC worked with CPSC staff to develop a program in October 1994 to encourage consumers to eliminate or tie down loops in their window blinds. Redesign of pull cords to eliminate single tassel loops became industry action effective in January 1995.[2] Since then, almost all horizontal blinds have been manufactured with individual cords that terminate in separate tassels.

[2] "industry action effective" is a term used to denote industry wide incorporation of a design into production units.

By November 2000, CPSC staff was aware of 16 deaths (that had occurred since 1991) associated with the inner cords that are used to raise and lower horizontal blinds. The CPSC and the WCSC announced a recall to repair horizontal blinds with accessible inner cords. The WCSC offered free repair kits to consumers, consisting of plastic pieces that attach to the blind cord to prevent the inner cords from being pulled out of the blind and forming a loop. The industry added inner cord stops to horizontal blinds in November 2000. The voluntary standard was revised to include provisions to address inner cord accessibility and the revised standard, ANSI/WCMA A100.1-2002, was published in 2002.

3. Incident Data Analysis

CPSC staff and WCMA members formed a subcommittee to review reports of 79 fatal incidents that occurred between January 1996 and December 2002 involving window covering products. The subcommittee agreed that this time period of 7 years would provide an adequate representation of the range of incidents that have occurred and the hazard patterns associated with each incident. These incidents were neither all that may have occurred during this time period nor a sample of known probability of selection. Nevertheless, they provide a body of information about serious window covering incidents reported to CPSC in recent years.

The reports consisted of in-depth investigations (IDIs) compiled by CPSC field investigators assigned to follow up fatalities where a window blind cord was involved in the incident. These IDIs typically included a summary written by the field investigator, police report, medical examiner's report, death certificate, photographs and/or drawings of the product involved, and any corresponding newspaper article. Most of the IDIs reviewed in this effort contained enough information to classify the product and the component of the product involved in the fatal incident, as well as the method of strangulation. However, a few IDIs consisted solely of a death certificate or news article and therefore lacked reliable information on the product involved or the circumstances contributing to the incident.

The subcommittee agreed to the terminology, product categories, incident factors, and interpretations that formed the outline of the analysis. Appendix 1 contains a data table of the 79 reports that were reviewed and the corresponding breakdown of each incident. Appendix 2 contains a guide to the table with definitions of each category.

There were 79 fatal incidents associated with window covering products reported to CPSC from January 1996 through December 2002, for which in-depth investigations could be completed. The number of incidents by year of occurrences is shown in Figure 2 below:

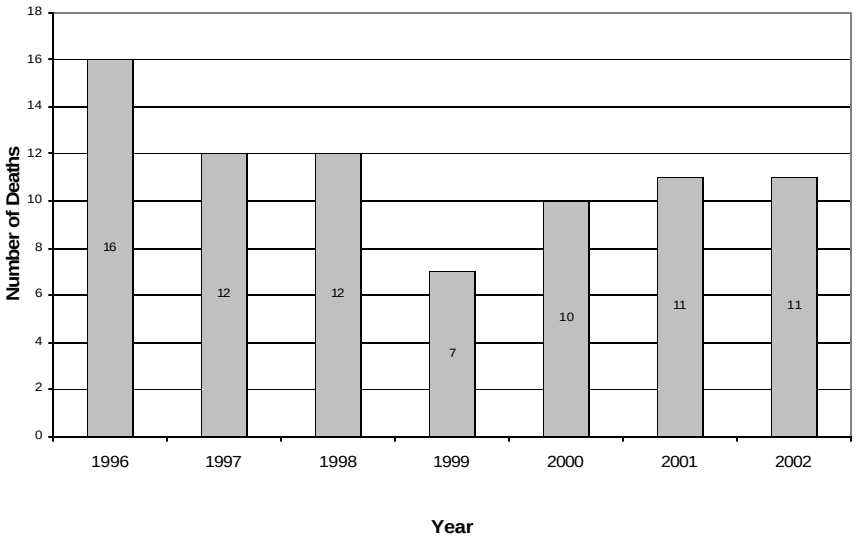

Figure 2. Fatal Incidents Associated with Window Covering Cords (1996-2002)

Of the 79 IDIs reviewed, 13 lacked enough information to determine the design and configuration of the window covering product involved or to determine how the incident occurred. These 13 incidents were eliminated from further study and are indicated as shaded entries in Appendix 1. The remaining 66 incidents are further analyzed by age of the victim, hazard patterns, conformance of the product to the voluntary standard, adequacy of the voluntary standard to address the incident, and operating system type.

As seen in Figure 3, window covering incident victims ranged in age from 8 months to 78 months. The children involved most frequently were those in the 12-15 month range, but children up to 6.5 years of age were also entangled in window covering cords.

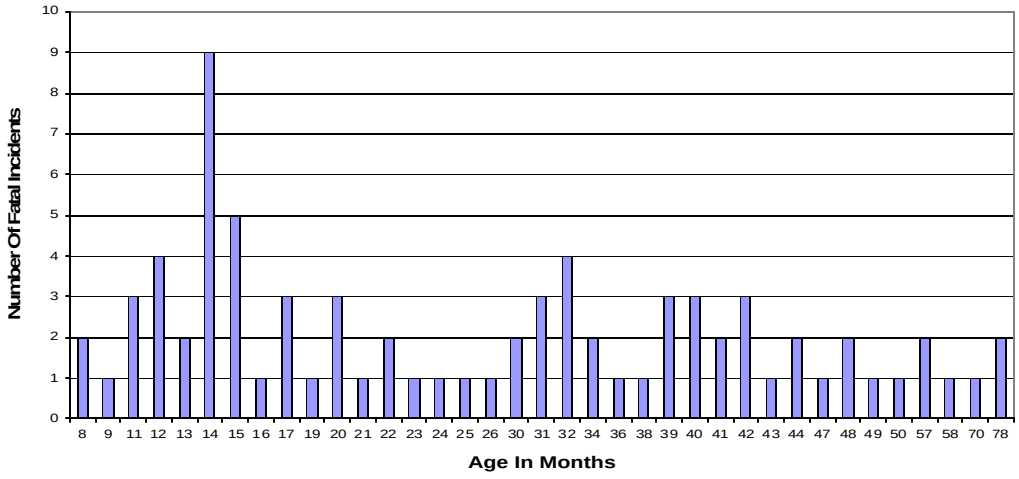

Figure 3. Age of Victims in Fatal Window Covering Incidents (1996-2002)

4. Hazard Patterns

The hazard patterns were deduced from what was known about the product, the ligature marks on the victim, and pre-incident descriptions provided in police reports and/or investigator interviews with persons familiar with the incident. There were no witnesses to the incident in any of the reports.

As shown in Figure 4, the hazard scenarios were: 1) Product Configuration -- strangulation in a loop that is an existing part of the product's configuration such as single tassel cords and free hanging cord loops; 2) Modified Cord -- strangulation in a loop that was formed by a cord that was knotted or tied up in some way; 3) Inner Cord -- strangulation in a loop formed in the inner cord of a horizontal blind; 4) Victim Manipulated-- strangulation due to the child wrapping a cord or loop around his/her neck, and 5) Unknown -- undetermined hazard patterns due to lack of information.

The majority of the incidents that involved the product's configuration occurred in the continuous loop of vertical blinds or draperies. The majority of the incidents that involved strangulation in a loop formed by modification of the blind cord occurred in the lift cords of horizontal blinds. All the inner cord incidents involved a horizontal blind.

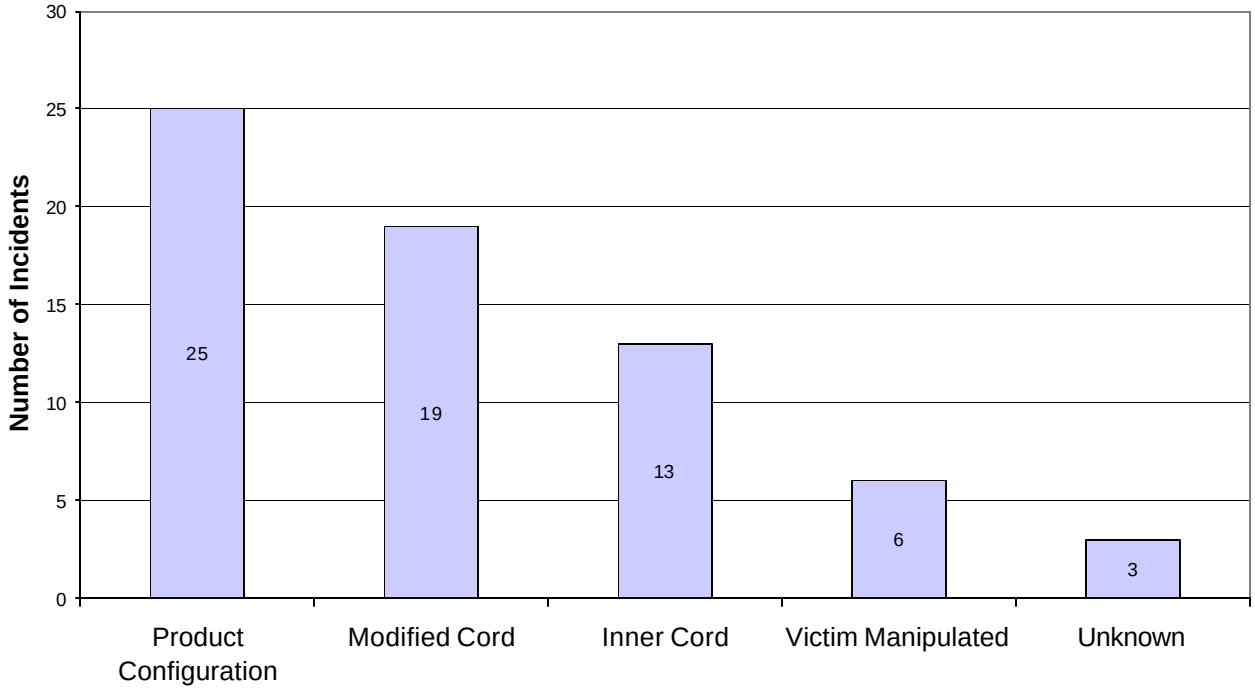

Figure 4. Source of Loop Formation in Fatal Window Covering Incidents (1996-2002)

A distribution of the hazard scenarios by year is shown in Figure 5. There does not seem to be a discernible trend in any of the hazard scenarios.

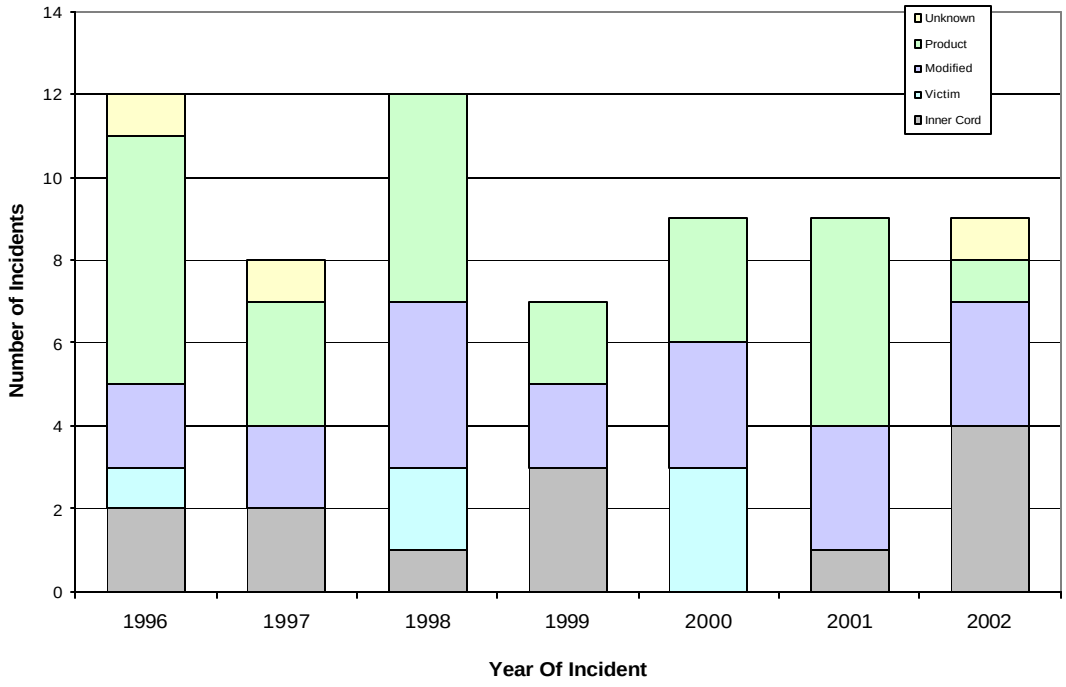

Figure 5. Source of Loop Formation in Fatal Incidents by Year

5. Conformance of Product to Voluntary Standard ANSI/WCMA A100.1 - 2002

For the purposes of this review, the configuration of the product part that was involved in the incident was the determining factor for conformance to the voluntary standard. Product conformance to the 2002 standard indicates conformance to the 1996 standard as well since the only change in 2002 was to add requirements to address inner cord accessibility. The following table summarizes the cord configurations that were found in this analysis and the corresponding conformance to the voluntary standard:

Product Cord Configuration	Corresponding Requirement (ANSI/WCMA A100.1-2002)	Conformance
multiple cords terminating in a single tassel	elimination of loops in operating cords	no
cords terminating in separate tassels	elimination of loops in operating cords	yes
lift cords that do not have inner cord stops	inner cord must not be accessible	no
free hanging cord or chain loop that is not tied down with a tension device	continuous loop control systems must have tension device	no

Of the 66 incidents reviewed for this analysis, 54 products did not meet the current voluntary standard, 6 products did meet the standard requirements, and 6 products could not be categorized. Products that did not meet the voluntary standard included 13 horizontal blinds that did not have inner cord stops, 16 horizontal blinds with cords that terminated in a single tassel, 23 continuous

loop control products whose cord or chain was not tied down with a tension device, and 2 roll-up blinds with pull cords that terminated in a single point. Products that met the voluntary standard included 5 horizontal blinds with operating cords that terminated in separate tassels and one continuous loop control product where a tension device was present (but not used). The distribution of product conformance by year is shown in Figure 6, which indicates that the majority of incidents continue to occur in products that do not meet the current voluntary standard. The configuration of the products that do not meet the voluntary standard suggests that they were older products that were manufactured before the standard took effect.

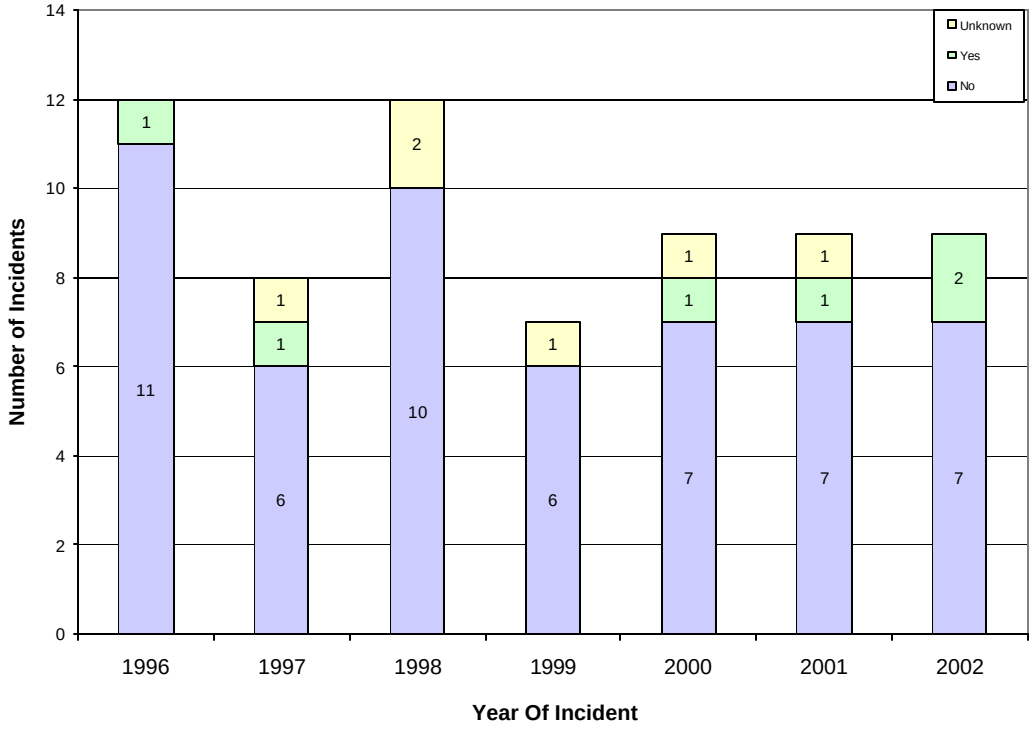

Figure 6. Product Conformance to 2002 Voluntary Standard

6. Adequacy of Voluntary Standard

Of the 66 incidents reviewed for this analysis, 40 incidents (60%) would have been addressed by requirements in the current voluntary standard if the product met the standard, 18 incidents (27%) would not have been addressed, 5 incidents (7.5%) may or may not have been addressed, and 3 incidents (4.5%) did not have enough information to determine if product conformance would have addressed the incident. The 5 questionable incidents are situations where the victim wrapped an existing loop more than once around his/her neck. If that loop was part of the product's design, then the voluntary standard's elimination of the loop would remove the primary hazard. However, if that loop was formed by a modification of the blind cord (such as the user tying a knot in the cord), the standard's requirements would not address that possibility.[3]

[3] Although the voluntary standard requires a temporary hang tag that warns the consumer not to tie the cords together, the presence of this tag was not noted in any of the incidents. Based on the limited effectiveness of warning labels and the fact that the hang tags are intended to be discarded, CPSC staff concluded that a temporary warning does not adequately prevent a user from tying knots in blind cords.

Details of how the standard requirements would have addressed the incidents are shown in Figure 7. Of the 40 incidents that would have been addressed by product conformance to the voluntary standard, 23 would have been addressed by the use of a tension device, 4 would have been addressed by elimination of a loop in the operating cord, and 13 would have been addressed by the use of inner cord stops. Of the 18 incidents that would not have been addressed by product conformance to the voluntary standard, 1 involved strangulation due to the victim wrapping the cord around her neck, 16 involved strangulation in a cord that was modified (usually tied into a knot), and 1 involved strangulation in the exposed loop above a stop ball.

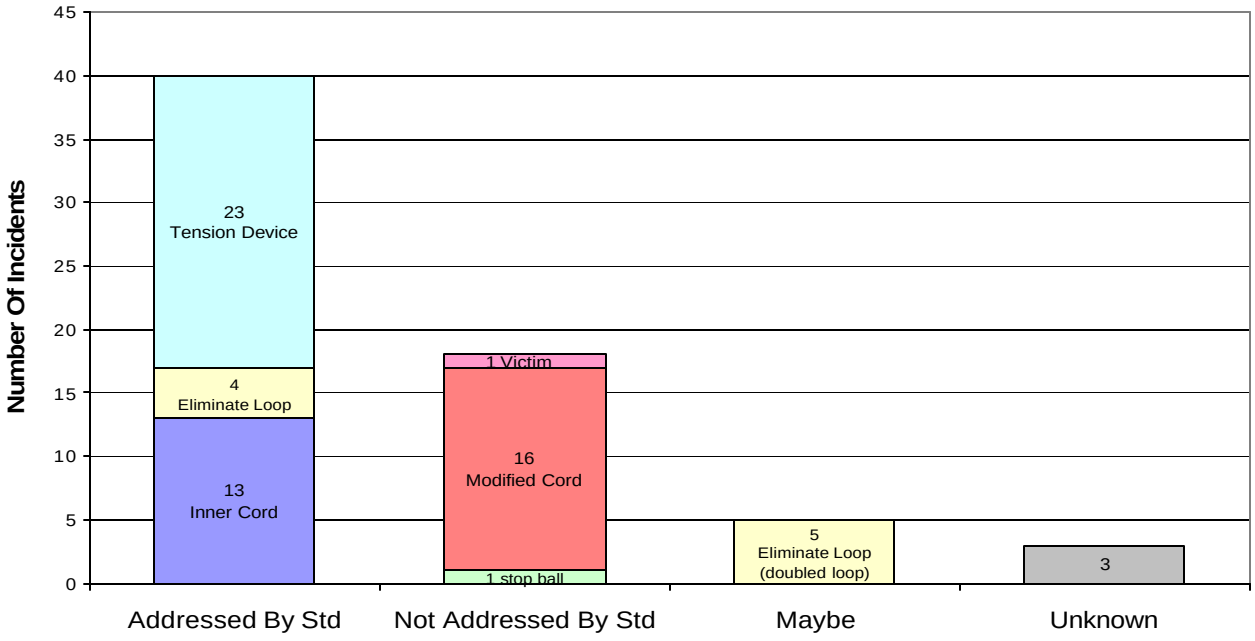

Figure 7. Incidents Addressed by 2002 Standard Requirements

Assuming that elimination of loops in the operating cord would eliminate the primary cause of the questionably addressed incidents, the current voluntary standard would address approximately 68% (45 out of 66) of the fatal incidents associated with window covering cords. As shown in Figure 7, the standard addresses those incidents with requirements for tension devices, inner cord stops, and elimination of loops in the operating cord. However, the tension device and inner cord stops depend on the user to correctly install or adjust the safety devices. If the safety devices are not properly installed, the product is still operable with potential hazards. In contrast, other requirements within the voluntary standard provide for fail safe operation of the safety device so that operation of the window covering cord is disabled should the safety device fail. For example, section 6.2.2.1 for cord retraction devices states that "The cord retraction device shall fail in the locked and raised position, disabling the window covering's cord operation". CPSC staff believes similar criteria should apply to the requirements for tension devices and inner cord stops.

The current voluntary standard does not address approximately 27% (18 out of 66) of the fatal incidents associated with window covering cords in this analysis. As seen in Figure 7, the voluntary

standard does not address incidents where the cord was modified, where the victim wrapped the cord around her neck, and in one instance, where the victim strangled in the loop above a stop ball. CPSC staff believes that modification of the cord by the consumer (such as tying a knot) and manipulation of the cord by the child (such as wrapping the cord around the neck) are foreseeable events that should be addressed by a safety standard with performance requirements rather than warning labels. In addition, the current standard allows an exposed loop for products that use a stop ball. The loop is accessible when the blind is raised, and CPSC staff is aware of one fatal incident associated with this type of window covering.

7. Analysis by Product Operating System Type

Cord Lift Control Products

Of the 66 incidents reviewed for this analysis, 40 cases (61%) involved window covering products that use a cord lift control system. Appendix 3 contains a data table of the 40 incidents associated with cord lift products. Most of the products that use a cord lift control system were horizontal blinds (38 of the 40 cases). One incident involved a Roman shade and the remaining incident involved a product type that was unknown.

Hazard Patterns in Cord Lift Control Products

In almost all cases, the victim manipulated a cord loop around his/her neck and subsequently strangled. From the IDIs, the subcommittee determined that the loops were formed by: 1) knots tied in the pull cords, 2) pull cords that had been tied to other objects, 3) pull cords that terminated in a single tassel, or 4) inner cords that were pulled out from between the horizontal slats. Many incidents involved the child climbing on furniture to access the cord loop and then falling or jumping. There have been no witnesses to these fatalities, thus the hazard patterns are deduced from what is known about the product, the ligature marks on the victim, and pre-incident descriptions provided in police reports or investigator interviews. The subcommittee defined one hazard pattern "victim doubling of cord loop" because multiple ligature marks and descriptions of how tightly the victim was entangled upon discovery support the theory that the victim placed his/her neck in a cord loop and then wrapped the loop a second time around his/her neck.[4] This distinction was made because the primary action of the victim placing his/her neck inside a loop is required in order for the victim's wrapping of the cord to become lethal. If the loop did not exist, the victim may not have been able to fatally wrap the cord around his/her neck.

Of the 40 incidents associated with products that use a cord lift control system, 14 incidents involved strangulation in a loop formed by the user's modification of the cord (in most cases tying a knot in the cord), 13 incidents involved strangulation in the inner cord, 5 incidents involved the victim double wrapping an existing loop around his/her neck, 5 incidents involved strangulation in a loop that is part of the product's design, and 3 incidents lacked enough information to determine how the strangulation occurred. Roughly a third of the incidents involved a loop that was caused by a modification of the blind cord and another third of the incidents involved a loop formed in the inner cord.

[4] Because this theory is deduced from ligature marks, it is unknown if the loop was an existing part of the product's design or if the cord was modified to form the loop.

Conformance of Cord Lift Control Products to Voluntary Standard

In incidents where strangulation occurred in the pull cord, a product with cords that terminate in a single tassel was defined as not conforming to the current voluntary standard. In incidents where strangulation occurred in the inner cord, a product without inner cord stops was defined as not conforming to the current voluntary standard.

Conformance of a product to the voluntary standard is not always relevant to the hazard pattern. For example, in cases where a knot was tied in the pull cord, a product with individual cords and tassels that conformed to the standard would not have prevented the incident.[5]

Of the 40 incidents associated with products that use a cord lift control system, 29 incidents (72.5%) involved products whose cord configuration did not meet the current voluntary standard, 5 incidents (12.5%) involved products whose cord configuration did meet the current voluntary standard, and 6 incidents (15%) involved products whose conformance to the voluntary standard was unknown. As shown in Figure 8, the majority of the cord lift products did not meet the current voluntary standard.

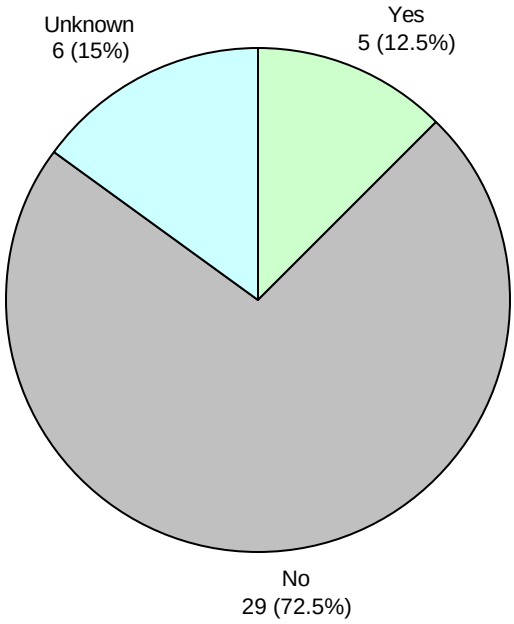

Figure 8. Product Conformance to Voluntary Standard
(Cord Lift Control Systems)

Of the 29 incidents that involved window covering products that did not conform to the voluntary standard, 13 products did not have inner cord stops and 16 products had lift cords that terminated in a single tassel. However, of the 16 products whose lift cords terminated in a single tassel, 7 victims strangled in a loop that was formed by a knot that was tied in the pull cord.

[5] Although the voluntary standard requires a temporary hang tag that warns the consumer not to tie the cords together, the presence of this tag was not noted in any of the incidents. Based on the limited effectiveness of warning labels and the fact that the hang tags are intended to be discarded, CPSC staff concluded that a temporary warning does not adequately prevent a user from tying knots in blind cords.

Of the 5 incidents that involved window covering products that conform to the voluntary standard, all 5 products were configured with operating cords that terminated in separate tassels. However, a knot was tied in the pull cord in 3 incidents. In the remaining 2 incidents, there was insufficient detail to determine how the strangulation occurred.

Of the 6 incidents where product conformance to the standard was unknown, a knot was tied in the pull cord in 4 incidents, the victim double wrapped a loop around her neck in 1 incident, and the victim strangled in the loop above a stop ball in 1 incident.

Adequacy of Voluntary Standard for Cord Lift Control Products

Of the 40 incidents associated with products that used a cord lift control system, 22 incidents (55%) would have been addressed if the product had met the requirements in the voluntary standard**,** 15 incidents (37.5%) occurred in a manner not addressed by the voluntary standard, and 3 incidents (7.5%) were unknown (see Figure 9). Product compliance with the current voluntary standard would have addressed 13 incidents that involved the inner cord and 9 incidents that involved a loop formed by a single tassel in the pull cord (assuming that a single tassel was the primary cause of the loop in 5 incidents where the victim wrapped the loop around his/her neck a second time). Product compliance with the standard would not have addressed 14 incidents that involved a loop that was formed by a knot tied in the pull cord and 1 incident that involved the loop above a stop ball. The voluntary standard does require a temporary hang tag that warns the consumer not to tie the cords together, but CPSC staff concluded that a warning label that is intended to be discarded upon product use does not adequately prevent a user from tying a knot in blind cords.

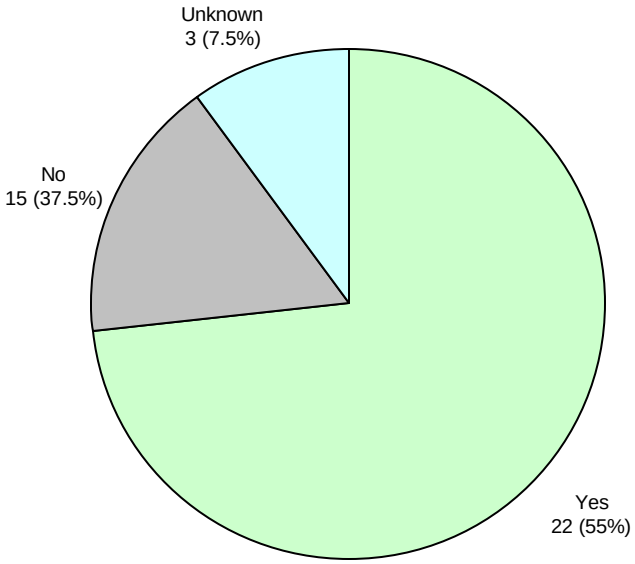

Figure 9. Incidents Addressed by Voluntary Standard
(Cord Lift Control Systems)

Assuming that elimination of loops in the operating cord (separate cords) would eliminate the primary cause in the incidents where the victim wrapped the loop a second time around his/her neck, the current voluntary standard would address approximately 55% of the incidents associated with cord lift products. More than half of those incidents are addressed with inner cord stop requirements that depend on active user participation to properly install the safety devices. If the safety devices are not installed properly, the product is operable with the inner cord hazard still present.

The current voluntary standard did not address 37.5% of the incidents associated with cord lift products. Specifically, the standard does not prevent users from tying a knot in the cord to form a hazardous loop, does not prevent the victim from wrapping the cord around his/her neck, and does not prevent strangulation in the exposed loop above a stop ball.

Continuous Loop Control Products

Of the 66 incidents reviewed for this analysis, 24 incidents (36%) involved window covering products that use a continuous loop control system. Appendix 4 contains a data table of the 24 incidents associated with continuous loop control products. Most of the products that used a continuous loop control system were vertical blinds (13 of the 24 incidents) and drapes (7 of the 24 incidents). Of the 4 remaining incidents, one involved a cellular shade, one involved a roller shade, one involved a horizontal blind, and the last involved a product type that was unknown.

Hazard Patterns in Continuous Loop Control Products

In almost all of the incidents, the victim strangled in a free hanging continuous loop from the operating system of a vertical blind or traverse rod for drapes. The ligature mark on the victim identifies whether the continuous cord or the beaded chain of the product was involved.

Of the 24 incidents associated with products that used a continuous cord loop control system, 20 incidents (83%) involved strangulation in a free hanging loop that is an inherent part of the product configuration and 4 incidents (17%) involved strangulation in a loop formed by the modification of the blind cord. Modification of the cord includes one incident where the cord was knotted, one incident where the cord loop was wrapped around another object and formed a loop, one incident where the cord loop was removed from an anchor, and one incident where it appeared that the traverse rod for the drapes was instead used as a curtain rod and the cord was left tangled.

Conformance of Continuous Loop Control Products to Voluntary Standard

For window covering products that require a continuous loop control system, the voluntary standard requires that the product be assembled with a tension device attached to the cord loop, along with fasteners and installation instructions. In addition, the use of a tool or sequential process must be employed to detach the tension device (the rationale for this requirement is to encourage use of the tension device).

None of the incident reports stated whether or not the product had a tension device attached to the cord loop upon purchase. For the purposes of this analysis, incidents where the product did not have a properly installed tension device on the continuous cord or chain were defined as not

meeting the standard. Conformance of the product to the voluntary standard is relevant to the hazard pattern because the use of a tension device would have addressed all the incidents.

Of the 24 incidents associated with products that used a continuous cord loop control system, 23 incidents (96%) involved products whose cord configuration did not meet the current voluntary standard because a tension device was not present. One incident involved a product that did not meet the standard because the cord loop was removed from a tension device that was anchored to the wall.

Adequacy of Voluntary Standard to Continuous Loop Control Product Incidents

All 24 incidents associated with products that used a continuous loop control system were addressed by the tension device requirement in the voluntary standard. The standard requires that a tension device be attached to the cord loop upon purchase of the product, and that the tension device be difficult to remove to discourage users from avoiding use of the product. The tension device is intended to be secured in a fashion that keeps the continuous loop taut and therefore less accessible by children.

The tension device requirement in the current voluntary standard would have addressed 100% of the incidents in this analysis that were associated with continuous loop control products, if those products had conformed to the standard. However, the requirement is dependent on active user participation to properly install the tension device. If the tension device is not used, the product is still operable with a hazardous loop that is accessible. CPSC staff is aware of one fatal incident where the tension device was present but not used.

Loop Lift Control Products (Roll Up Blinds)

Of the 66 incidents reviewed for this analysis, 2 incidents (3%) involved window covering products that used a loop lift control system. Appendix 5 contains a data table of the 2 incidents associated with loop lift control products. In both incidents, the product was a roll-up blind.

Hazard Patterns in Loop Lift Products

In both incidents, the victim strangled in the operating cords of the product. In one incident, multiple knots were made in the operating cord. In the other incident, the victim was a developmentally-delayed 6 year old child who became entangled in the lengthy operating cords of one or more roll-up blinds (there were multiple roll-up blinds in an enclosed patio area).

Conformance and Adequacy of Voluntary Standard

Neither of the products in each incident met the current voluntary standard requirements for elimination of loops in the operating cord. However, product compliance to the standard would not have prevented user modification of the cord or victim entanglement in the operating cords.

The current voluntary standard does not specifically address roll-up blinds which have longer operating cords by design.

8. Conclusions

- Approximately 61% (40 out of 66) of the incidents reviewed for this analysis involved products that use a cord lift control system (typically horizontal blinds) and 36% (24 out of 66) of the incidents involved products that use a continuous loop control system (typically vertical blinds and draperies).
- The leading hazard scenarios are: 1) strangulation in continuous loop cord or chain of vertical blinds and draperies, 2) strangulation in loop formed by knot tied in horizontal blind lift cords, and 3) strangulation in inner cord of horizontal blinds.
- The current voluntary standard addresses approximately 68% (45 out of 66) of the incidents reviewed for this analysis, primarily with requirements for tension devices and inner cord stops.
- Approximately 27% (18 out of 66) of the incidents reviewed for this analysis occurred in a way not addressed by the current voluntary standard. Hazard scenarios were strangulation in a loop formed by modification of the cord and strangulation due to the victim wrapping a cord or loop around his/her neck.
- Approximately 82% (54 out of 66) of the incidents reviewed for this analysis involved older products whose cord configurations did not meet the current voluntary standard requirements. While product conformance to the standard does not necessarily relate to prevention of the incident, it is an indicator that pre-standard window covering products continue to be involved in incidents.
- As a result of the hazard patterns identified in this analysis of incident data, CPSC staff believes that there are foreseeable circumstances where a loop of cord is exposed or accessible in a window covering product, presenting a hazard to children. In general, these circumstances could result from improper installation of safety devices (such as cord stops or tension devices) by a consumer, or where a sufficient length of cord is exposed that could be wrapped around the neck of a child.

9. Recommendations

CPSC staff believes that WCMA should consider revising current requirements in the voluntary standard to remove any potential for these foreseeable circumstances to occur. Specifically,

- The current standard requirements for inner cord accessibility do not address the possibility that the user may not properly install or adjust inner cord stops to prevent the inner cord from being pulled into a loop. Horizontal blinds with improperly adjusted inner cord stops could be avoided by passively controlling inner cord accessibility at the headrail. For products where locking the inner cord at the headrail is not possible, a warning should be provided to alert the user to the importance of properly adjusting the inner cord stops.

- The current requirements for tension devices do not address the possibility that users may still use the product without properly installing the tension device. CPSC staff is aware of one fatal incident where the tension device was present but not used. Products that employ continuous loop systems could be required to be inoperable unless the tension device is properly installed.

- Incidents where the blind cord was modified by the user or the victim constitute 36% (15 out of 41) of the incidents associated with cord lift products. A requirement that eliminates the operating cord or limits the length of the exposed cord to 7.25 inches would prevent the possibility of cord manipulation into a hazardous loop on products that use a cord lift control system.[6] It would also eliminate strangulations associated with loops formed by multiple cords terminating in a single tassel. Currently, cordless products and products without exposed cords may not be feasible for all types of window covering applications due to cost. However, staff believes that the window covering industry should develop cost effective products that eliminate the strangulation hazard.

- In addition to improvements to the voluntary standard, CPSC staff believes that hazards in existing window covering products must be addressed through continued efforts to warn consumers of the potential hazards associated with older window covering products.

[6] The neck circumference of a 5th percentile 7-9 month old child is 7.25 inches.

Appendix 1: Fatal Window Covering Incidents (1996-2002)

IDI #	Ref #	Type	Operating System Type	Operating System Design	Cord Config Meets Std		Hazard Pattern				Design Solution
					96 std	02 std	Inner Cord	Victim	Modified Cord	Product	
960304HCN0685	1	H	cord lift	2 cords, sep tassels	Y	Y					U
960227CWE5006	2	U	U	U	U	U					U
960403CCC5089	3	RS	continuous loop control	cont loop w/o tension device	N	N				X	tension device
960611CCC5239	4	H	U	U	U	U					U
960520CNE5140	5	C	continuous loop control	cont loop w/o tension device	N	N				X	tension device
960827CBB5576	6	H	cord lift	tasseled loop	N	N				X	separate cords
960524CCC5190	7	H	cord lift	U	NA	N	X				inner cord stop
960611CCC5238	8	H	cord lift	tasseled loop	N	N				X	separate cords
970218CCC5320	9	U	U	U	U	U					U
960717CCC5351	10	H	cord lift	tasseled loop	N	N				X	separate cords
970619CCC3227	11	H	continuous loop control	cont loop w/o tension device	N	N				X	tension device
961023CCC5005	12	H	cord lift	tasseled loop	N	N			X		NA*
961107CCC5040	13	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
961125CWE7249	14	H	cord lift	U	NA	N	X				inner cord stop
970708CCC3254	15	U	U	U	U	U					U
980109CCC2177	16	H	cord lift	tasseled loop	N	N			X		NA*
981020CCC3026	17	H	cord lift	tasseled loop	N	N					U
970127CNE5071	18	V	continuous loop control	cont loop w/o tension device	N	N				X	tension device
980115HCC3534	19	V	U	U	U	U					U
970321CWE4110	20	H	U	U	U	U					U
980113CCC2220	21	H	cord lift	U	NA	N	X				inner cord stop
970916CWE4149	22	U	U	U	U	U					U
970522CCC3168	23	V	continuous loop control	cont loop w/o tension device	N	N				X	tension device
981001CCC4014	24	H	cord lift	3 cords, sep tassels	Y	Y			X		NA*
970709CCC3258	25	H	cord lift	U	U	U			X		NA*
971015CCC1584	26	H	U	U	U	U					U
971119CWE5009	27	H	cord lift	tasseled loop	N	N				X	separate cords
980112CCN0131	28	H	cord lift	U	NA	N	X				inner cord stop
980209CCC3581	29	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
980305CBB5364	30	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
980522CCC1437	31	V	continuous loop control	cont loop w/weight w/o tension device	N	N				X	tension device

IDI #	Ref #	Type	Operating System Type	Operating System Design	Cord Config Meets Std		Hazard Pattern				Design Solution
					96 std	02 std	Inner Cord	Victim	Modified Cord	Product	
980326CCC0231	32	H	cord lift	tasseled loop	N	N			X		NA*
980310CBB6684	33	V	continuous loop control	cont cord w/o tension device	N	N			X		tension device
980528CCC6842	34	R	cord lift	U	U	U			X		NA*
980701CWE7175	35	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device
980813CBB5779	36	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device
980821CBB0662	37	H	cord lift	U	NA	N	X				inner cord stop
981222CCC2128	38	H	cord lift	tasseled loop	N	N			X		NA*
001013CBB0041	39	H	cord lift	U	U	U		X			NA* -- doubled loop
990818CCC0674	40	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
990325CCC0369	41	H	cord lift	U	NA	N	X				inner cord stop
990728HCC3423	42	H	cord lift	U	NA	N	X				inner cord stop
990121CBB2205	43	H	cord lift	2 cords, sep tassels	NA	N	X				inner cord stop
990520CNE5172	44	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
990618CWE6004	45	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
001017CBB2033	46	D	continuous loop control	traverse loop w/o tension device	N	N			X		tension device
010117CCC0232	47	H	cord lift	3 cords, unknown ends	U	U			X		NA*
001117CBB3055	48	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
000214CBB2293	49	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
000331CWE6005	50	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device
000714CNE5665	51	U	cord lift	multiple cords into stop ball	U	U				X	eliminate stop ball, break away
010628CCC3361	52	U	U	U	U	U					U
010323CCC3221	53	U	continuous loop control	chain loop w/o tension device	N	N				X	tension device
000831CNE5737	54	H	cord lift	2 cords, sep tassels	Y	Y			X		NA*
010614HCC2573	55	D	continuous loop control	traverse loop w/o tension device	N	N			X		tension device
001102CNE5849	56	RU	cord loop lift	looped pull cord	N	N			X		NA*
010111CCC3134	57	RU	cord loop lift	looped pull cord	N	N		X			NA*
010109CBB0204	58	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
010125CNE6092	59	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
010205CCN0282	60	V	continuous loop control	cont cord w/hanging weight w/o tension device	N	N				X	tension device
010607CCC3331	61	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
010510CNE6334	62	H	cord lift	tasseled loop	N	N			X		NA*

IDI #	Ref #	Type	Operating System Type	Operating System Design	Cord Config Meets Std		Hazard Pattern				Design Solution
					96 std	02 std	Inner Cord	Victim	Modified Cord	Product	
010615CNE6462	63	H	U	U	U	U					U
011212CCC2118	64	H	cord lift	2 cords, sep tassels	NA	N	X				inner cord stop
010815CNE6651	65	H	cord lift	U	U	U			X		NA*
011211CCC1174	66	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, separate cords, wand
020301CCC1368	67	H	cord lift	2 cords, sep tassels	Y	Y			X		NA*
030122CCC1285	68	H	U	U	U	U					U
021016CCC3022	69	D	continuous loop control	traverse loop w/tension device removed	Y	Y			X		NA*
020610CCC1605	70	H	cord lift	2 cords, sep tassels	Y	Y					U
020716HCC3266	71	H	cord lift	U	NA	N	X				inner cord stop
020604CNE7347	72	H	cord lift	tasseled loop	N	N			X		NA*
020619CCN0542	73	H	cord lift	U	NA	N	X				inner cord stop
020807CCN0684	74	H	cord lift	tasseled loop	N	N			X		NA*
020905CCN0794	75	H	U	U	U	U					U
021112CCN0097	76	H	cord lift	U	NA	N	X				inner cord stop
021107CNE7560	77	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device
021219CCN0213	78	H	cord lift	U	NA	N	X				inner cord stop
021216CCC3132	79	U	U	U	U	U					U

* formation of the loop not addressed by voluntary standard

Summary: (shaded entries lack enough information to be used in analysis)
incidents used for analysis = 66

Product Type
cord lift = 40
continuous loop control = 24
loop lift = 2

Hazard Pattern
products = 25
modified cord = 19
inner cord = 13
victim = 6
[doubled loop = 5]
[wrap around = 1]
unknown = 3

Conformance to Voluntary Standard
no = 54
[tasseled loop = 16]
[lack inner cord stops = 13]
[lacked tension device = 23]
[roll-up blind cord = 2]
yes = 6
unknown = 6

Incidents Addressed by Voluntary Standard
no = 18
[modified cord = 16]
[victim wrap around = 1]
[stop ball = 1]
yes = 45
[tension device = 23]
[inner cord stop = 13]
[separate cords = 9]
(includes 5 doubled loop incidents)
unknown = 3

Appendix 2: Guide to Data Table

Column Title	Code	Definition
IDI #	13 digit IDI number	IDI number
Date	8 digit date code	date that incident occurred
Age	Age in months	Age in months
Product Type	H	Horizontal blind
	V	Vertical blind
	R	Roman Shade
	C	Cellular Shade
	D	Drapery Rod
	RS	Roller Shade
	RU	Roll Up blind
Operating System Type	cord lift	a bottom rail is raised by lift cords
	continuous loop control	a mechanism is operated by a continuous cord or chain; this can raise/lower a bottom rail in a horizontal product, slide rails in a vertical product, or rotate the vertical rails
	traverse rod with cont loop	the traverse rod of a drapery product is controlled with a continuous cord loop
Operating System Design	# cords, sep tassels	individual cords end in separate tassels
	cont loop w/o tension device	the continuous loop cord was not tied down with a tension device
	tasseled loop	the lift cords ends terminate in a single tassel, forming a loop
	rotator chain loop w/o tension device	the continuous chain that rotates the vertical rails was not tied down with a tension device
	traverse loop w/o tension device	the continuous cord that operates a drapery product was not tied down with a tension device
96 std	Y = yes N = no U = unknown	defines if the component of the product that was involved in the strangulation met the applicable 1996 standard requirement
02 std	Y = yes N = no U = unknown	defines if the component of the product that was involved in the strangulation met the applicable 2002 standard requirement
Inner Cord	X or blank	if this column was marked it indicates that the inner cord of a horizontal blind was accessed by the victim and resulted in strangulation
Victim	X or blank	if this column was marked it indicates that the victim wrapped the cord around his/her neck
Modified Cord	X or blank	if this column was marked it indicates that the cord was modified (cords knotted or tied up to an object) to form the loop in which the victim was found
Product	X or blank	if this column was marked it indicates that the victim was found in a loop that is part of the product design
Design Solution	NA*	the formation of the loop is not addressed by the voluntary standard
	tension device	access to the continuous loop can be prevented with the use of a tension device
	sep cords	the loop at the tassel can be eliminated with cords that end in separate tassels
	inner cord stop	properly installed inner cord stops can prevent the inner cord from being pulled into a loop
	tension device, sep cords, wand	access to the continuous chain can be prevented with a tension device, or the chain loop can be replaced by a rotator wand or two separate chains
	U = unknown	unknown, there is not enough information to determine a design solution

Appendix 3: Incidents Involving Cord Lift Control Products

IDI #	Ref #	Type	Operating System Type	Operating System Design	Cord Config Meets Std		Hazard Pattern				Design Sol'n
					96 std	02 std	Inner Cord	Victim	Modified Cord	Product	
960304HCN0685	1	H	cord lift	2 cords, sep tassels	Y	Y					U
960827CBB5576	6	H	cord lift	tasseled loop	N	N				X	separate cords
960524CCC5190	7	H	cord lift	U	NA	N	X				inner cord stop
960611CCC5238	8	H	cord lift	tasseled loop	N	N				X	separate cords
960717CCC5351	10	H	cord lift	tasseled loop	N	N				X	separate cords
961023CCC5005	12	H	cord lift	tasseled loop	N	N			X		NA*
961107CCC5040	13	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
961125CWE7249	14	H	cord lift	U	NA	N	X				inner cord stop
980109CCC2177	16	H	cord lift	tasseled loop	N	N			X		NA*
981020CCC3026	17	H	cord lift	tasseled loop	N	N					U
980113CCC2220	21	H	cord lift	U	NA	N	X				inner cord stop
981001CCC4014	24	H	cord lift	3 cords, sep tassels	Y	Y			X		NA*
970709CCC3258	25	H	cord lift	U	U	U			X		NA*
971119CWE5009	27	H	cord lift	tasseled loop	N	N				X	separate cords
980112CCN0131	28	H	cord lift	U	NA	N	X				inner cord stop
980305CBB5364	30	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
980326CCC0231	32	H	cord lift	tasseled loop	N	N			X		NA*
980528CCC6842	34	R	cord lift	U	U	U			X		NA*
980821CBB0662	37	H	cord lift	U	NA	N	X				inner cord stop
981222CCC2128	38	H	cord lift	tasseled loop	N	N			X		NA*
001013CBB0041	39	H	cord lift	U	U	U		X			NA* -- doubled loop
990325CCC0369	41	H	cord lift	U	NA	N	X				inner cord stop
990728HCC3423	42	H	cord lift	U	NA	N	X				inner cord stop
990121CBB2205	43	H	cord lift	2 cords, sep tassels	NA	N	X				inner cord stop
010117CCC0232	47	H	cord lift	3 cords, unknown ends	U	U			X		NA*
001117CBB3055	48	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
000214CBB2293	49	H	cord lift	tasseled loop	N	N		X			NA* -- doubled loop
000714CNE5665	51	U	cord lift	multiple cords into stop ball	U	U				X	eliminate stop ball, break away
000831CNE5737	54	H	cord lift	2 cords, sep tassels	Y	Y			X		NA*
010510CNE6334	63	H	cord lift	tasseled loop	N	N			X		NA*
011212CCC2118	65	H	cord lift	2 cords, sep tassels	NA	N	X				inner cord stop
010815CNE6651	66	H	cord lift	U	U	U			X		NA*

IDI #	Ref #	Type	Operating System Type	Operating System Design	Cord Config Meets Std		Hazard Pattern				Design Sol'n
					96 std	02 std	Inner Cord	Victim	Modified Cord	Product	
020301CCC1368	68	H	cord lift	2 cords, sep tassels	Y	Y			X		NA*
020610CCC1605	71	H	cord lift	2 cords, sep tassels	Y	Y					U
020716HCC3266	72	H	cord lift	U	NA	N	X				inner cord stop
020604CNE7347	73	H	cord lift	tasseled loop	N	N			X		NA*
020619CCN0542	74	H	cord lift	U	NA	N	X				inner cord stop
020807CCN0684	75	H	cord lift	tasseled loop	N	N			X		NA*
021112CCN0097	77	H	cord lift	U	NA	N	X				inner cord stop
021219CCN0213	79	H	cord lift	U	NA	N	X				inner cord stop

* formation of the loop not addressed by voluntary standard

Summary:
cord lift incidents = 40

Product Type
horizontal blinds = 38
roman shades = 1
unknown product = 1

Hazard Pattern
modified cord = 14
inner cord = 13
victim = 5
[doubled loop = 5]
product = 5
unknown = 3

Conformance to Voluntary Standard
no = 29
[tasseled loop = 16]
[lack inner cord stops = 13]
yes = 5 (separate tassels)
unknown = 6

Incidents Addressed by Voluntary Standard
no = 15
[modified cord = 14]
[stop ball = 1]
yes = 22
[inner cord stop = 13]
[separate cords = 9]
(includes 5 doubled loop incidents)
unknown = 3

Appendix 4: Incidents Involving Continuous Loop Control Products

IDI #	Ref #	Type	Operating System Type	Operating System Design	Cord Config Meets Std		Hazard Pattern				Design Solution
					96 std	02 std	Inner Cord	Victim	Modified Cord	Product	
960403CCC5089	3	RS	continuous loop control	cont loop w/o tension device	N	N				X	tension device
960520CNE5140	5	C	continuous loop control	cont loop w/o tension device	N	N				X	tension device
970619CCC3227	11	H	continuous loop control	cont loop w/o tension device	N	N				X	tension device
970127CNE5071	18	V	continuous loop control	cont loop w/o tension device	N	N				X	tension device
970522CCC3168	23	V	continuous loop control	cont loop w/o tension device	N	N				X	tension device
980209CCC3581	29	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
980522CCC1437	31	V	continuous loop control	cont loop w/weight w/o tension device	N	N				X	tension device
980310CBB6684	33	V	continuous loop control	cont cord w/o tension device	N	N			X		tension device
980701CWE7175	35	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device
980813CBB5779	36	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device
990818CCC0674	40	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
990520CNE5172	44	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
990618CWE6004	45	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
001017CBB2033	46	D	continuous loop control	traverse loop w/o tension device	N	N			X		tension device
000331CWE6005	50	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device
010323CCC3221	53	U	continuous loop control	chain loop w/o tension device	N	N				X	tension device
010614HCC2573	55	D	continuous loop control	traverse loop w/o tension device	N	N			X		tension device
010109CBB0204	58	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
010125CNE6092	59	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
010205CCN0282	60	V	continuous loop c ontrol	cont cord w/hanging weight w/o tension device	N	N				X	tension device
010607CCC3331	61	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
011211CCC1174	67	V	continuous loop control	rotator chain loop w/o tension device	N	N				X	tension device, sep cords, wand
021016CCC3022	70	D	continuous loop control	traverse loop w/tension device removed	Y	Y			X		tension device
021107CNE7560	78	D	continuous loop control	traverse loop w/o tension device	N	N				X	tension device

Summary:
continuous loop control incidents = 24

Product Type
vertical blinds = 13
draperies = 7
cellular shade = 1
roller shade = 1
horizontal blind = 1
unknown = 1

Hazard Pattern
product = 20
modified cord = 4

Conformance to Voluntary Standard
no = 23
yes = 1 (tension device was present but not used)

Incidents Addressed by Voluntary Standard
yes = 23
[tension device = 23]
no = 1
[modified cord = 1]
(cord was removed from tension device)

Appendix 5: Incidents Involving Loop Lift Control Products (Roll-Up Blinds)

IDI #	Ref #	Type	Operating System Type	Operating System Design	Cord Config Meets Std		Hazard Pattern				Design Solution
					96 std	02 std	Inner Cord	Victim	Modified Cord	Product	
001102CNE5849	56	RU	loop lift	looped pull cord	N	N			X		NA*
010111CCC3134	57	RU	loop lift	looped pull cord	N	N		X			NA*

* formation of the loop not addressed by voluntary standard

Summary:
loop lift incidents = 2

Product Type
roll-up blinds = 2

Hazard Pattern
victim = 1
modified cord = 1

Conformance to Voluntary Standard
no = 2
yes = 0

Incidents Addresed by Voluntary Standard
no = 2
[modified cord = 1]
[victim wrap around = 1]