UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: OCT 26 2000

TO : The Commission
Sadye E. Dunn, Secretary

FROM : Michael S. Solender, General Counsel MSS
Stephen Lemberg, Assistant General Counsel SL
Patricia M. Pollitzer, Attorney PMP

SUBJECT : Revision of Garage Door Operator Standard

BALLOT VOTE due: NOV - 7 2000

Attached is a draft final rule that would revise the Commission's garage door operator standard to reflect changes UL has made to its standard upon which the Commission standard was based.

Please indicate your vote on the following options.

I. Approve the draft Federal Register notice without change.

_____ _____
Signature Date

II. Approve the draft Federal Register notice with the following changes (please specify):

_____

_____

_____

_____ _____
Signature Date

CPSA 6 (b)(1) Cleared
10/27/00
No Mfrs/Prvtlblrs or Products Identified
Excepted
Firms Notified.
Comments Processed.

NOTE: This document has not been reviewed or accepted by the Commission.
Initial ____ Date 10/26/00

III. Do not approve the draft Federal Register notice.

Signature _____ Date _____

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: OCT 26 2000

TO : The Commission
Sadye E. Dunn, Secretary

THROUGH: Michael Solender, General Counsel MSS
Pamela Gilbert, Executive Director PG

FROM : Ronald L. Medford, Assistant Executive Director, RLM
Office of Hazard Identification and Reduction
John R. Murphy, Mechanical Engineer,
Directorate for Engineering Sciences John R Murphy Jr

SUBJECT : Revision of Garage Door Operator Standard, 16 (CFR) Part 1211

I. Introduction

The U.S. Consumer Product Safety Commission (CPSC) published a notice of proposed rulemaking (NPR) to revise the garage door operator standard in the Federal Register on June 14, 2000. The NPR provided for a public comment period that ended on August 28, 2000. One public comment was received. This briefing package provides the background of the standard, a review of the comment received, a draft final rule and a staff recommendation to issue the final rule to amend the Commission's standard for automatic residential garage door operators.

II. Background

In the Consumer Product Safety Improvement Act of 1990 (the Improvement Act), Congress mandated that automatic residential garage door operators (GDOs) manufactured on or after January 1, 1991 conform to the entrapment protection requirements of the 1988 version of Underwriters Laboratories, Inc. (UL) Standard for Safety–UL 325. A copy of the Improvement Act is provided at Tab A. On June 19, 1991, the Commission issued the garage door operator standard (16 CFR Part 1211). The Improvement Act also required that the Commission revise the GDO standard to include additional entrapment protection provisions adopted by UL. The Commission did so on December 21, 1992 (57 Fed. Reg. 60449).

The Improvement Act provides that when UL makes changes to the entrapment protection provisions of UL 325, UL must notify the Commission of proposed revisions. Those changes must be incorporated into the Commission rule unless the Commission notifies UL within 30 days that the Commission has determined the revisions do not carry out the purposes of the Improvement Act.

NOTE: This document has not been reviewed or accepted by the Commission.
Initial MLS **Date** 10/26/00

CPSA 6 (b)(1) Cleared
10/27/00
No Mfrs/PrvtLblrs or Products Identified

III. Discussion

A. The Current Mandatory Standard

The Commission's standard requires that all residential garage door operators sold in the United States have an inherent reversing mechanism capable of reversing the motion of a downward moving garage door within 2 seconds. This system is referred to as an inherent system because it is physically located within the housing of the garage door operator.

In addition, the operator shall be provided with a "means" for connection of an external entrapment-sensing device. Most garage door operators on the market today use an electric eye as the external entrapment-sensing device. The purpose of this device is to monitor the area under the garage door for people who might become entrapped by the garage door. The standard also allows a device known as a door edge sensor, similar to the sensors used on elevator doors, or any other device that provides equivalent protection. These devices are known as external entrapment sensing devices because they are located outside the housing of the garage door operator.

The standard also allows a device known as a constant contact control button in lieu of an external entrapment-sensing device. The constant contact control button is a wall mounted device that requires a consumer to press and hold the button for the door to close completely. If the consumer releases the button the door will stop. The button must be mounted within view of the garage door. The purpose of the constant contact control button is to ensure that the consumer monitors the area under the door as it closes. The constant contact control button provides an inexpensive alternative to electric eyes and door edge sensors.

In addition, the standard requires all garage door operators to have a device referred to as a 30-second clock. The 30-second clock is a back-up device that reopens the door if the door can not close completely within 30 seconds, as would be the case when a person becomes entrapped under the door. The 30-second clock is a back up to the primary inherent entrapment system that must reverse the door within 2 seconds should a person become entrapped under the door.

The standard also requires that every garage door operator be equipped with a "means to manually detach the door operator from the door." The reason for this requirement is to enable a person to quickly detach the operator from the door in the event a person becomes entrapped under the door. For most garage doors, pulling on a red handle that hangs below the garage door operator actuates the means of detachment.

B. Recent Revisions to UL 325

UL revised its standard on September 18, 1998. A memo from the Directorate for Engineering Sciences outlines the changes to the standard (Tab B). A copy of UL 325 that only contains the entrapment protection requirements that apply to automatic garage door operators is provided at Tab C. Three substantive changes were made. These changes allow

for new technological advances and do not modify the requirements for conventional garage door operators.

The first of the three substantive changes allows for a new type of entrapment protection system that monitors the actual position of the door. This type of system is not required to have a 30-second clock. A system that monitors the position of the door instantly detects when the door has stopped moving as would be the case in an entrapment and reverses the door without waiting 30 seconds. Systems that do not measure the actual position of the door would still be required to have a 30-second clock.

The second substantive change allows for a secondary inherent entrapment protection device that takes the place of the secondary external entrapment protection device, such as the electric eye and door edge sensor. It is referred to as inherent, because the actual mechanism is enclosed within the casing of the garage door operator. It is referred to as secondary because it provides back-up entrapment protection to the primary device. This device is only allowed if it is completely independent of the primary entrapment protection device.

The third substantive change applies to garage door operators that are not directly connected to the garage door. Some newer garage door operators that are mounted to the header of the door and are not directly connected to the door do not need a means to detach, since the door can easily be raised while still connected to the operator. All requirements for operating instructions and field installed labels have been modified to allow a system that is not directly connected to the door. All garage door operators that are directly connected to the garage door must continue to have a means to detach the garage door operator from the door.

In addition, UL has made editorial changes to provide better descriptions of the appropriate requirements and to insert mandatory code language where needed. Other standards that have been incorporated into the garage door operator standard by reference have been updated to the most recent version.

C. Economic Impact

The Commission is required by the Regulatory Flexibility Act of 1980 (RFA) to address and give particular attention to the economic effects on small entities. The staff believes that due to the nature of the revisions, they are unlikely to have any adverse impact on small businesses or other entities. The Directorate for Economic Analysis prepared a memorandum for the proposed rule (Tab D) indicating that according to industry sources, there are 22 manufacturers or importers of GDOs; only one of these uses the new mechanisms that would be permitted under the revised standard. With over 1,000 employees, this firm would not be considered a small business under Small Business Administration guidelines. The substantive changes affect only the companies that either use the new designs or may adapt them to future production. No firm would be required to make changes to its products in order to conform to the standard. Any firms that currently comply with UL 325 would continue to comply after the technical amendments. The revisions will

not render other models obsolete, and are not expected to significantly affect consumer demand. The Directorate for Economic Analysis indicates that information in its previous memorandum is still accurate.

D. Public Comment

One public comment, included at Tab E, was received from students at Florida International University. The comment provides a discussion of garage door safety in general. The students indicate that the mandatory standard should require both external entrapment protection-sensing devices and a constant contact control button.

The current mandatory standard treats the constant contact control button, the electric eye, and edge sensors as equivalent devices. The electric eye and door edge sensor monitor the area underneath the door automatically. The constant contact control button ensures that the consumer will monitor the closing garage door. Remote controls are not allowed to close a door protected by a constant contact control button, because a remote control would negate the effectiveness of the constant contact control button.

Requiring both an external entrapment protection device and a constant contact control would mean that all garage doors would have to be closed by a person standing in the garage, at the button, until the door is completely closed. This would result in a significant inconvenience to consumers and likely lead to consumers attempting to defeat the safety system. The staff believes that the level of safety provided by the current standard is adequate to prevent entrapments.

The provisions commented on by the Florida International students have been in the standard since January 1, 1993 and are not a part of the revisions currently under consideration. These comments go beyond the narrow focus of the current rulemaking; revising the existing CPSC standard to reflect the recent changes to UL 325.

IV. Recommendation

The staff recommends that the Commission issue the final rule to amend the Commission's standard for automatic residential garage door operators. A draft final rule is attached at Tab F to reflect recent changes UL has made to UL 325. The rule will become effective 30 days from the date of publication in the Federal Register.

TAB A

SEC. 203. AUTOMATIC GARAGE DOOR OPENERS.

(a) CONSUMER PRODUCT SAFETY RULE.—The provisions of subsection (b) shall be considered to be a consumer product safety rule issued by the Consumer Product Safety Commission under section 9 of the Consumer Product Safety Act.

(b) REQUIREMENTS.—

(1) Effective on and after January 1, 1991, each automatic residential garage door opener manufactured on or after that date for sale in the United States shall conform to the entrapment protection requirements of the American National Standards Institute Underwriters Laboratories, Inc. Standards for Safety—UL 325, third edition, as revised May 4, 1988.

(2)(A) Effective on and after January 1, 1993, all residential automatic garage door openers manufactured on and after such date for sale in the United States shall conform to any additional entrapment protection requirements of the American National Standards Institute Underwriters Laboratories, Inc. Standards for Safety—UL 325, third edition, which were issued after the date of the enactment of this Act to become effective on or before January 1, 1993.

(B) If, by June 1, 1992, the Underwriters Laboratories, Inc., has not issued a revision to the May 4, 1988, Standards for Safety—UL 325, third edition, to require an entrapment protection feature or device in addition to that required by the May 4, 1988, Standard, the Consumer Product Safety Commission shall begin a rulemaking proceeding, to be completed no later than October 31, 1992, to require an additional such feature or device on all automatic residential garage door openers manufactured on or after January 1, 1993, for sale in the United States. If such a revision is issued by the Underwriters Laboratories, Inc. after the rulemaking has commenced, the rulemaking shall be terminated and the revision shall be incorporated in the consumer product safety rule under subsection (a) unless the Commission has determined under subsection (c) that such revision does not carry out the purposes of subsection (b).

(c) REVISION OF RULE.—If, after June 1, 1992, or the date of a revision described in subsection (b)(2)(B) if later, the Underwriters Laboratories, Inc. proposes to further revise the entrapment protection requirements of the American National Standards Institute Underwriters Laboratories, Inc. Standards for Safety—UL 325, third edition, the Laboratories shall notify the Consumer Product Safety Commission of the proposed revision and the proposed revision shall be incorporated in the consumer product safety rule under subsection (a) unless, within 30 days of such notice, the Commission notifies the Laboratories that the Commission has determined that such revision does not carry out the purposes of subsection (b).

(d) LABELING.—On and after January 1, 1991, a manufacturer selling or offering for sale in the United States an automatic residential garage door opener manufactured on or after January 1, 1991, shall clearly identify on any container of the system and on the system the month or week and year the system was manufactured and its conformance with the requirements of subsection (b). The display of the UL logo or listing mark, and compliance with the date marking requirements of UL 325, on both the container and the system, shall satisfy the requirements of this subsection.

(e) NOTIFICATION.—Effective on and after July 1, 1991, all manufacturers of automatic residential garage door openers shall, in consultation with the Consumer Product Safety Commission, notify the public of the potential for entrapment by garage doors equipped with automatic garage door openers and advise the public to test their openers for the entrapment protection feature or device required by subsection (b).

(f) PREEMPTION.—In applying section 26(a) of the Consumer Product Safety Act (15 U.S.C. 2075) with respect to the consumer product safety rule of the Consumer Product Safety Commission under subsection (a), only those provisions of laws of States or political subdivisions which relate to the labeling of automatic residential garage door openers and those provisions which do not provide at least the equivalent degree of protection from the risk of injury associated with automatic residential garage door openers as the consumer product safety rule provides shall be subject to such section.

(g) REGULATIONS.—Section 553 of title 5, United States Code, shall apply with respect to the issuance of any regulations by the Consumer Product Safety Commission to implement the requirements of this section and sections 7 and 9 of the Consumer Product Safety Act do not apply to such issuance. Any additional or revised requirement issued by the Commission shall provide an adequate degree of protection to the public.

(h) CONSTRUCTION.—Nothing in this section shall affect or modify in any way the obligations or liabilities of any person under the common law or any Federal or State law.

TAB B

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: March 17, 2000

TO : David A. Walden, Acting Associate Executive Director,
Directorate for Engineering Sciences

THROUGH: Nicholas V. Marchica, Division Director, Division of Mechanical Engineering

FROM : John R. Murphy, Mechanical Engineer, Division of Mechanical Engineering

SUBJECT : Revision to 16 CFR part 1211

The Consumer Product Safety Improvement Act of 1990 (CPSIA) provided that, as of January 1, 1991, each residential garage door operator manufactured for sale in the United States shall conform to the entrapment protection requirements of the Underwriters Laboratories, Inc. (UL) Standard for Safety – UL 325. Congress stated that these requirements are to "be considered a consumer product safety rule issued by the Consumer Product Safety Commission (CPSC) under Section 9 of the Consumer Product Safety Act". In addition, Congress provided that UL notify the Commission of any future changes to UL 325 and that those changes be incorporated into the safety rule unless the Commission determines that the changes do not carry out the purposes of the CPSIA.

UL revised the voluntary standard, UL 325 on September 18, 1998. There are three substantive changes to the entrapment protection provisions of the standard that will require changes to the mandatory standard for garage door operators. In addition, there are other revisions to the entrapment protection provisions that are editorial in nature.

The first of the three substantive changes allows for a new type of entrapment protection system to monitor the actual position of the door. This type of system is not required to have a 30-second clock. The 30-second clock is a back-up device that reopens the door if the door can not close completely within 30 seconds, as would be the case when a person becomes entrapped under the door. The 30-second clock is a back up to the primary inherent entrapment system that must reverse the door within two seconds should a person become entrapped under the door. A system that monitors the position of the door instantly knows when the door has stopped moving as would be the case in an entrapment and can reverse without waiting 30 seconds. Systems that do not measure the actual position of the door would still be required to have a 30-second clock.

The second substantive change allows for a secondary inherent entrapment protection device that takes the place of the secondary external entrapment protection device, such as the electric eye and door edge sensor. It is referred to as inherent, because the actual mechanism is enclosed within the casing of the garage door operator. It is referred to as secondary because it provides back-up entrapment protection to the primary device. This device is only allowed if it is completely independent of the primary entrapment protection device.

The third substantive change applies to garage door operators that are not directly connected to the garage door. Currently the standard requires that all garage door operators have a means to disconnect the garage door operator from the garage door. The reason for this is to enable a person to quickly detach the operator from the door in the event a person becomes entrapped under the door. The current mandatory standard requires that the means be colored red and be capable of being adjusted to a height of six feet above the floor to maintain uniformity between garage door operator brands. The means of detachment is usually a red handle that hangs below the garage door operator. The door can be released from the operator by pulling on this handle. Some newer garage door operators that are mounted to the header of the door and are not directly connected to the door do not need a means to detach since the door can easily be raised while still connected to the operator. All requirements for operating instructions and field installed labels have been modified to allow a system that is not directly connected to the door. All garage door operators that are directly connected to the garage door must still have a means to detach the garage door operator from the door.

In addition, UL has made editorial changes to provide better descriptions of the appropriate requirements and to insert mandatory code language where needed. One example of the use of mandatory code language involves restating the requirements without using the words "if" or "may". These mandatory code language changes would allow the adoption of some provisions of UL 325 into the International Building Code. Another example of the editorial changes is that other standards that have been incorporated into the garage door operator standard by reference have been updated to the most recent version.

Engineering Sciences believes that these changes improve the level of safety provided by the mandatory standard by updating the standard to the latest developments in garage door operator technology.

TAB C

UL 325

Door, Drapery, Gate, Louver, and Window Operators and Systems

This document only contains the entrapment provisions of UL 325 that apply to Automatic Residential Garage Door Openers

These provisions were extracted from the February 25, 2000 version of the standard

3 Glossary

3.5 RESIDENTIAL GARAGE-DOOR OPERATOR – A vehicular door operator serving a residential building of one to four single family units.

3.22 INHERENT ENTRAPMENT SENSOR SYSTEM – An automatic sensor system, examples being a photoelectric sensor, an edge sensor, or similar entrapment protection device, which senses entrapment of a solid object and is incorporated as a permanent and integral part of an operator.

3.22 revised February 25, 2000

3.23 ENTRAPMENT – The condition when an object is caught or held in a position that increases the risk of injury.

Added 3.23 effective September 18, 1998

5 Units of Measurement

5.1 If a value for measurement is followed by a value in other units in parentheses, the second value may be only approximate. The first stated value is the requirement.

5.1 revised February 25, 2000

17.3 The functioning of a motor-protective device, whether such device is required or not, shall not result in a risk of fire, electrick shock, or injury to persons.

PROTECTION AGAINST RISK OF INJURY TO PERSONS

25 General

25.1 If an automatically-reset protective device is employed, automatic restarting of a motor shall not result in a risk of injury to persons.

25.2 An appliance is considered to comply with the requirement in 25.1 if some means is provided to prevent the motor from restarting when the protector closes.

25.3 Parts supported or actuated hydraulically shall not develop a risk of injury to persons due to pressure loss.

25.4 An enclosure, an opening, a frame, a guard, a knob, a handle, or the like shall not be sufficiently sharp to cause a risk of injury to persons in normal maintenance or use.

25.5 An electronic or solid-state circuit that performs a back-up, limiting, or other function intended to reduce the risk of fire, electric shock, or injury to persons, including entrapment protection circuits, shall comply with the requirements in the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991, including environmental and stress tests appropriate to the intended usage of the end-product.

25.6 The following test parameters are to be used in the investigation of the circuit covered by 25.5 for compliance with the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991:

a) With regard to electrical supervision of critical components, an operator being inoperative with respect to downward movement of the door meets the criteria for trouble indication.

b) A field strength of 3 volts per meter is to be used for the Radiated EMI Test.

c) The Composite Operational and Cycling Test is to be conducted for 14 days at temperature extremes of minus 35°C (minus 31°F) and 70°C (158°F).

d) Exposure Class H5 is to be used for the Humidity Test.

e) A vibration level of 5g is to be used for the Vibration Test.

f) When a Computational Investigation is conducted, λ_p shall not be greater than 6 failures/10^6 hours for the entire system. For external secondary entrapment protection devices that are sold separately, λ_p shall not be greater than 0 failures/10^6 hours. For internal secondary entrapment protection devices whether or not they are sold separately, λ_p shall not be greater than 0 failures/ 10^6 hours. The Operational Test is to be conducted for 14 days.

Exception: An external secondary entrapment protection device that is sold separately, and that has a λ_p greater than 0 failures/10^6 hours meets the intent of the requirement when for the combination of the operator and the specified external secondary entrapment protection device λ_p does not exceed 6 failures/10^6 hours. See 53.3.3 – 53.3.5.

g) When the Demonstrated Method Test is conducted, the multiplier is to be based on the continuous usage level, and a minimum of 24 units for a minimum of 24 hours per unit are to be tested.

h) The Endurance Test is to be conducted concurrently with the Operational Test. The control shall perform its intended function while being conditioned for 14 days in an ambient air temperature of 60°C (140°F), or 10°C (18°F) greater than the operating temperature of the control, whichever is higher. During the test, the control is to be operated in a manner representing the opening and closing of the door at a rate of one open-close operation per minute.

i) For the Electrical Fast Transient Burst Test, test level 3 is to be used for residential garage door operators and all other indoor use operators. For all other operators, test level 4 is to be used.

Revised 25.6 effective March 1, 2000

25.7 In the evaluation of entrapment protection circuits used in residential garage door operators, the critical condition flow chart shown in Figure 25.1 shall be used to:

a) Conduct a failure-mode and effect analysis (FMEA),

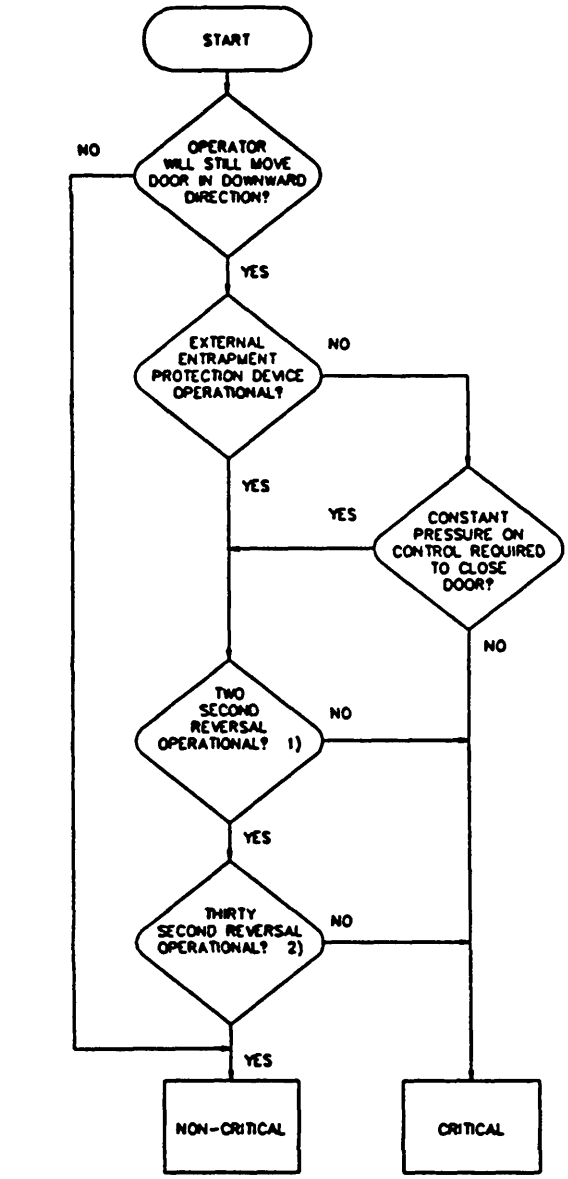
b) In investigating the performance during the Environmental Stress Tests, and

c) During the Power Cycling Tests in accordance with the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991.

25.7 revised September 18, 1998

Figure 25.1
Critical condition flow chart for residential garage door operator entrapment protection devices and functions

Figure 25.1 revised September 18, 1998



NOTES –

1) See 31.2.1.

2) See 31.2.6.

31 Residential Garage Door Operator and Door Operator Systems

31.1 General

31.1.1 A residential garage door operator system shall be supplied with primary inherent entrapment protection that complies with the requirements as specified in 31.2.1– 31.2.8.

31.1.1 revised September 18, 1998

31.1.2 In addition to the primary inherent entrapment protection as required by 31.1.1, a residential garage door operator shall comply with one of the following:

a) Shall be constructed to:

1) Require constant pressure on a control to lower the door,

2) Reverse direction and open the door to the upmost position when constant pressure on a control is removed prior to operator reaching its lower limit, and

3) Limit a portable transmitter, when supplied, to functioning only to cause the operator to open the door;

b) Shall be provided with a means for connection of an external secondary entrapment protection device as described in 31.3.1 – 31.3.3; or

c) Shall be provided with an inherent secondary entrapment protection device as described in 31.3.1, 31.3.2, and 31.3.4.

31.1.2 revised September 18, 1998

31.1.3 Revised and relocated as 45.5 effective March 1, 2000

31.1.4 Revised and relocated as 45.6 effective March 1, 2000

31.1.5 Revised and relocated as 31.2.8 September 18, 1998

31.1.6 In the case of a door operator system that relies on the operator mounted to the header of the door for compliance with the requirements in this Standard, the door shall comply with the requirements in Specifications for Sectional Overhead Type Doors, ANSI/DASMA 102-1996. A pinch point shall not be contacted by the probe illustrated in Figure 9.1 using the procedures described in paragraphs 9.3, 9.4, 9.5, and 9.7. In addition, a section joint of a residential sectional garage door, that admits a 0.35 inch (9 mm) diameter rod that is 3.9 inches (100 mm) long, shall also admit a 1.0 inch (25 mm) diameter rod that is 3.9 inches (100 mm) long, at all positions of the door. Rubber or textile coverings or shields, when used to cover the joint, shall pass the same test. Evaluation of pinch points shall be made with the door installed on all track configurations supplied with the door.

31.1.6 added September 18, 1998

31.2 Inherent entrapment protection

31.2.1 Other than for the first 1 foot (305 mm) of travel as measured over the path of the moving door, both with and without any external entrapment protection device functional, the operator of a downward moving residential garage door shall initiate reversal of the door within 2 seconds of contact with the obstruction as specified in 31.2.2. After reversing the door, the operator shall return the door to, and stop the door at, the full upmost position. Compliance shall be determined in accordance with 31.2.2 – 31.2.8.

Exception: The door operator is not required to return the door to, and stop the door at, the full upmost position when an inherent entrapment circuit senses a second obstruction or a control is actuated to stop the door during the upward travel.

31.2.1 revised February 25, 2000

31.2.2 A solid object is to be placed on the floor of the test installation and at various heights under the edge of the door and located in line with the driving point of the operator. When tested on the floor, the object shall be 1 inch (25.4 mm) high. In the test installation, the bottom edge of the door under the driving force of the operator is to be against the floor when the door is fully closed.

Exception: For operators other than those attached to the door, a solid object is not required to be located in line with the driving point of the operator. The solid object is to be located at points at the center and within 1 foot of each end of the door.

31.2.2 revised September 18, 1998

31.2.3 An operator is to be tested for compliance with 31.2.1 for 50 open-and-close cycles of operation while the operator is connected to the type of residential garage door with which it is intended to be used or with the doors specified in 31.2.5. For an operator having a force adjustment on the operator, the force is to be adjusted to the maximum setting or at the setting that represents the most severe operating condition. Any accessories having an effect on the intended operation of entrapment protection functions that are intended for use with the operator, are to be attached and the test is to be repeated for one additional cycle.

31.2.3 revised September 18, 1998

31.2.4 For an operator that is to be adjusted (limit and force) according to instructions supplied with the operator, the operator is to be tested for 10 additional obstruction cycles using the solid object described in 31.2.2 at the maximum setting or at the setting that represents the most severe operating condition.

31.2.4 revised September 18, 1998

31.2.5 For an operator that is intended to be used with more than one type of door, one sample of the operator is to be tested on a sectional door with a curved track and one sample is to be tested on a one-piece door with jamb hardware and no track. For an operator that is not intended for use on either or both of these types of doors, a one-piece door with track hardware or a one-piece door with pivot hardware shall be used for the tests. For an operator that is intended for use with a specifically dedicated door or doors, a representative door or doors shall be used for the tests. See the marking requirements in 53.3.1.

31.2.5 revised September 18, 1998

31.2.5A An operator, using an inherent entrapment protection system that monitors the actual position of the door, shall initiate reversal of the door and shall return the door to, and stop the door at, the full upmost position in the event the inherent door operation "profile" of the door differs from the originally set parameters. The entrapment protection system shall monitor the position of the door at increments not greater than 1 inch (25.4 mm).

Exception: The door operator is not required to return the door to, and stop the door at, the full upmost position when an inherent entrapment circuit senses an obstruction or a control is actuated to stop the door during the upward travel.

31.2.5A added September 18, 1998

31.2.6 An operator, using an inherent entrapment protection system that does not monitor the actual position of the door, shall initiate reversal of the door and shall return the door to, and stop the door at, the full upmost position, when the lower limiting device is not actuated within 30 seconds or less following the initiation of the close cycle.

Exception: The door operator is not required to return the door to, and stop the door at, the full upmost position when an inherent entrapment circuit senses an obstruction or a control is actuated to stop the door during the upward travel. When the door is stopped manually during its descent, the 30 seconds shall be measured from the resumption of the close cycle.

31.2.6 revised September 18, 1998

31.2.7 To determine compliance with 31.2.5A or 31.2.6, an operator is to be subjected to 10 open-and-close cycles of operation while connected to the door or doors specified in 31.2.3 and 31.2.5. The cycles are not required to be consecutive. Motor cooling-off periods during the test meet the intent of the requirement. The means supplied to comply with 31.2.1 and 31.3.1 are to be inoperative or defeated during the test. An obstructing object is to be used so that the door is not capable of activating a lower limiting device.

31.2.7 revised September 18, 1998

31.2.8 During the closing cycle, the system providing compliance with 31.2.1 and 31.2.5A or 31.2.1 and 31.2.6 shall function regardless of a short- or open-circuit anywhere in any low-voltage external wiring, any external entrapment devices, or any other external component.

31.1.5 revised and relocated as 31.2.8 September 18, 1998

31.3 Secondary entrapment protection

31.3.1 A secondary entrapment protection device supplied with, or as an accessory to, an operator shall consist of:

a) An external photoelectric sensor that, when activated, results in an operator that is closing a door to reverse direction of the door and the sensor prevents an operator from closing an open door,

b) An external edge sensor installed on the edge of the door that, when activated, results in an operator that is closing a door to reverse direction of the door and the sensor prevents an operator from closing an open door,

c) An inherent door sensor independent of the system used to comply with Section 31.2 that, when activated, results in an operator that is closing a door to reverse direction of the door and the sensor prevents an operator from closing an open door, or

d) Any other external or internal device that provides entrapment protection equivalent to (a), (b), or (c).

31.3.1 revised September 18, 1998

31.3.2 With respect to 31.3.1, the operator shall monitor for the presence and correct operation of the device, including the wiring to it, at least once during each close cycle. In the event the device is not present or a fault condition occurs which precludes the sensing of an obstruction, including an open- or short-circuit in the wiring that connects an external entrapment protection device to the operator and the device's supply source, the operator shall be constructed such that:

a) A closing door shall open and an open door shall not close more than 1 foot (305 mm) below the upmost position, or

b) The operator shall function as required by 31.1.2(a).

31.3.2 revised February 25, 2000

31.3.3 An external entrapment protection device shall comply with the applicable requirements in Sections 32– 34 of this Standard.

31.3.3 revised September 18, 1998

31.3.4 An inherent secondary entrapment protection device shall comply with the applicable requirements in Door Sensors, Section 42A. Software used in an inherent entrapment protection device shall comply with the Standard for Safety Related Software, UL 1998.

31.3.4 added September 18, 1998

31.4 Additional features

31.4.1 A means to manually detach the door operator from the door shall be supplied. The gripping surface (handle) shall be colored red and shall be easily distinguishable from the rest of the operator. It shall be capable of being adjusted to a height of 6 feet (1.8 m) above the garage floor when the operator is installed according to the instructions specified in 51.3.1 and 51.4.1(4). The means shall be constructed so that a hand firmly gripping it and applying a maximum of 50 pounds (223 N) of force shall detach the operator with the door obstructed in the down position. The obstructing object, as described in 31.2.2, is to be located in several different positions. A marking with instructions for detaching the operator shall be supplied. The marking shall comply with 52.1 – 52.8.

Exception: A means to manually detach the door operator from the door is not required for a door operator that is not directly attached to the door and that controls movement of the door so that:

a) The door is capable of being moved open from any position other than the last (closing) 2 inches (50.8 mm) of travel, and

b) The door is capable of being moved to the 2-inch point from any position between closed and the 2-inch point.

31.4.1 revised September 18, 1998

31.4.2 Actuation of a control that initiates movement of a door shall stop and may reverse the door on the down cycle. On the up cycle, actuation of a control shall stop the door but not reverse it.

31.4.3 A residential garage door operator when tested as described in 39.1 shall have a maximum appliance current draw, excluding lamps or external devices, of not more than 5 amperes.

31.4.3 revised November 24, 1997

31.4.4 An operator shall be constructed so that adjustment of limit, force or other user controls and connection of external entrapment protection devices can be accomplished without exposing normally enclosed live parts or wiring. See 9.7.

EXTERNAL ENTRAPMENT PROTECTION DEVICES

32 All Devices

32.1 General

32.1.1 An external entrapment protection device shall perform its intended function when tested in accordance with 32.1.2 – 32.1.4.

32.1.2 The device is to be installed in the intended manner and its terminals connected to circuits of the operator as indicated by the installation instructions.

Effective date of 32.1.2 changed from July 16, 1999 to March 1, 2000

32.1.3 The device is to be installed and tested at minimum and maximum heights and widths representative of recommended ranges specified in the installation instructions. For doors, if not specified, devices are to be tested on a minimum 7-foot (2.1-m) wide door and maximum 20-foot (6.1-m) wide door.

Effective date of 32.1.3 changed from July 16, 1999 to March 1, 2000

32.1.4 If powered by a separate source of power, the power-input supply terminals are to be connected to supply circuits of rated voltage and frequency.

32.1.5 An external entrapment protection device requiring alignment, such as a photoelectric sensor, shall be provided with a means, such as a visual indicator, to show proper alignment and operation of the device.

32.2 Current protection test

32.2.1 There shall be no damage to the entrapment protection circuitry if low voltage field-wiring terminals or leads are shorted or miswired to adjacent terminals.

32.2.2 To determine compliance with 32.2.1, an external entrapment protection device is to be connected to an operator or other source of power in the intended manner, after which all connections to low-voltage terminals or leads are to be reversed as pairs, reversed individually, or connected to any low-voltage lead or adjacent terminal.

Effective date of 32.2.2 changed from July 16, 1999 to March 1, 2000

32.3 Water exposure tests

32.3.1 Revised and relocated as 32.3.1.1 effective March 1, 2000

32.3.1 Splash test

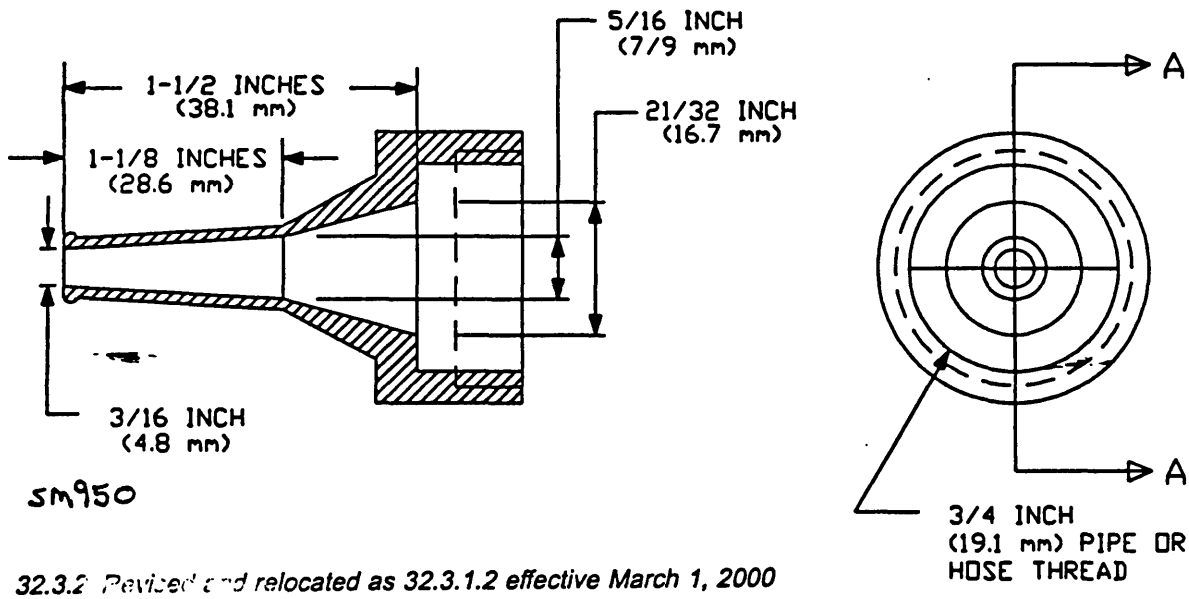
32.3.1.1 An external entrapment protection device intended to be installed inside a garage 3 feet (914 mm) or less above the floor shall withstand indirect water spray as described in 32.3.1.2 without resulting in a risk of electric shock and shall function as intended. After exposure to the water spray, the external surface of the device is to be dried before determining its functionality.

32.3.1 revised and relocated as 32.3.1.1 effective March 1, 2000

32.3.1.2 External entrapment protection devices are to be indirectly sprayed using a hose having the free end fitted with a nozzle as illustrated in Figure 32.1 and connected to a water supply capable of maintaining a flow rate of 5 gallons (19 liters) per minute as measured at the outlet orifice of the nozzle. The water from the hose is to be sprayed, from all sides and at any angle, against the floor under the device in a manner that results in water spray on the enclosure of electrical components. The nozzle is not to be brought closer than 10 feet (3.05 m) horizontally to the device. The water is to be sprayed for 1 minute.

32.3.2 revised and relocated as 32.3.1.2 effective March 1, 2000

Figure 32.1
Nozzle



32.3.2 Revised and relocated as 32.3.1.2 effective March 1, 2000

33 Photoelectric Sensors

33.1 Normal operation test (doors, vertical lift gates, and vertical pivot gates)

33.1.1 When installed as described in 32.1.1 – 32.1.4, a photoelectric sensor shall sense an obstruction as described in 33.1.2 that is to be placed on a level surface below the door or gate. The sensor is to be tested with the obstruction at a total of five different locations over the width of the door or gate opening. The locations shall include distances 1 inch (25.4 mm) from each end, 1 foot (305 mm) from each end, and the midpoint.

Revised 33.1.1 effective March 1, 2000

32.5 Resistance to impact test

32.5.1 An external entrapment protection device employing a polymeric or elastomeric material as a functional part shall be subjected to the impact test specified in 32.5.2. As a result of the test:

a) There shall not be cracking or breaking of the part, and

b) The part shall operate as intended.

A part that is dislodged, is not cracked or broken, and is capable of being restored to its original condition meets the intent of the requirement.

32.5.1 revised September 18, 1998

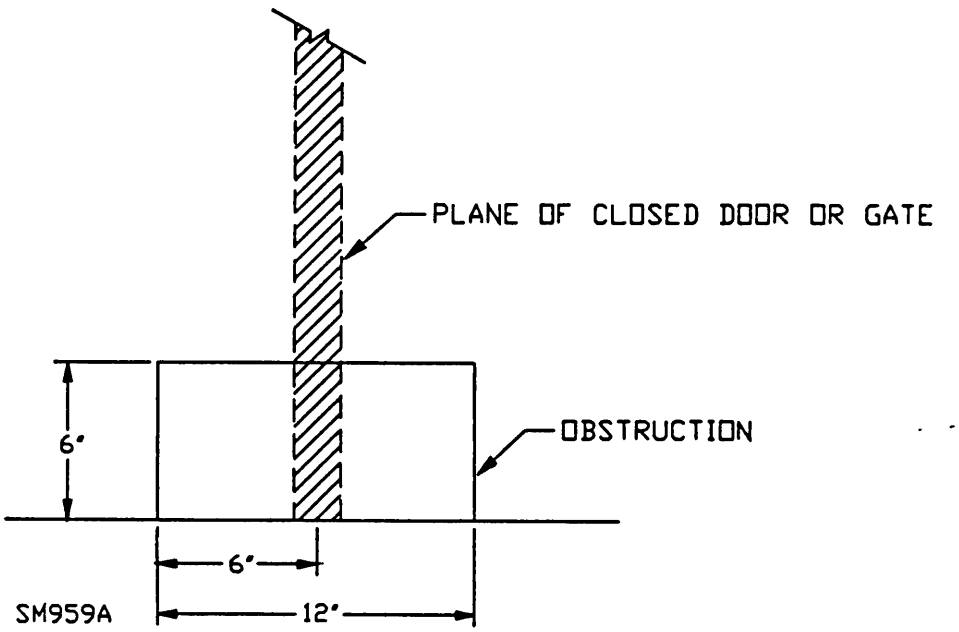
32.5.2 Samples of the external entrapment protection device are to be subjected to the Impact Test described in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C. The external entrapment protection device is to be subjected to 5 foot-pound (6.8 J) impacts. Three samples are to be tested, each sample being subjected to three impacts at different points.

33.1.2 The obstruction noted in 33.1.1 shall consist of a white vertical surface, 6 inches (152 mm) high by 12 inches (305 mm) long. The obstruction is to be centered under the door or gate perpendicular to the plane of the door or gate when in the closed position. See Figure 33.1.

Revised 33.1.2 effective March 1, 2000

Figure 33.1
Stationary obstruction

Effective date of Figure 33.1 changed from July 1, 1999 to March 1, 2000



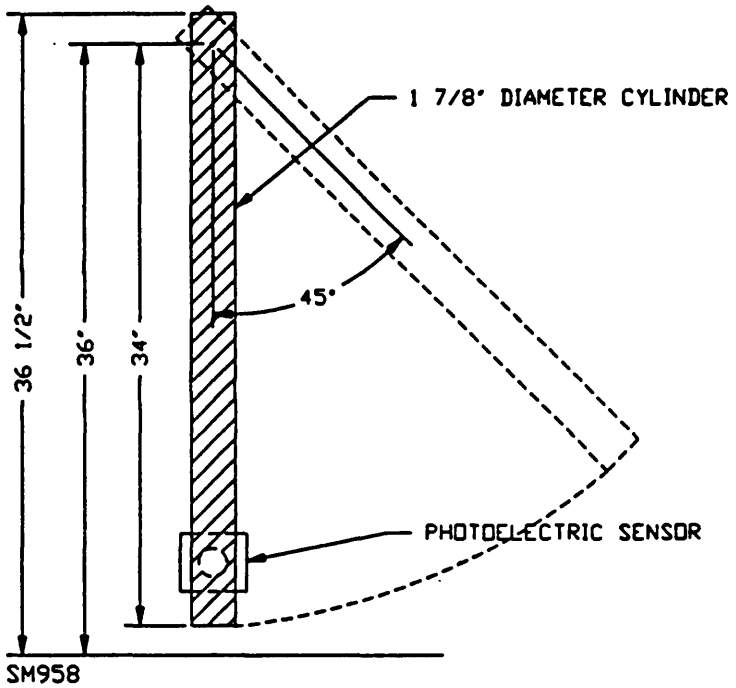
33.2 Sensitivity test

33.2.1 When installed as described in 32.1.1 – 32.1.4, a photoelectric sensor shall sense the presence of a moving object when tested according to 32.2.2.

33.2.2 The moving object is to consist of a 1-7/8 inch (47.6 mm) diameter cylindrical rod, 34-1/2 inches (876 mm) long, with the axis point being 34 inches (864 mm) from the end. The axis point is to be fixed at a point centered directly above the beam of the photoelectric sensor 36 inches (914 mm) above the level surface below the door or gate. The photoelectric sensor is to be mounted at the highest position as recommended by the manufacturer. The rod is to be swung as a pendulum through the photoelectric sensor's beam from a position 45 degrees from the plane of the door or gate when in the closed position. See Figure 33.2.

Effective date of 33.2.2 changed from July 1, 1999 to March 1, 2000

Figure 33.2
Moving obstruction



33.2.3 The test described in 33.2.2 is to be conducted at three points over the width of the door or gate opening, at distances of 1 foot (305 mm) from each end and the midpoint.

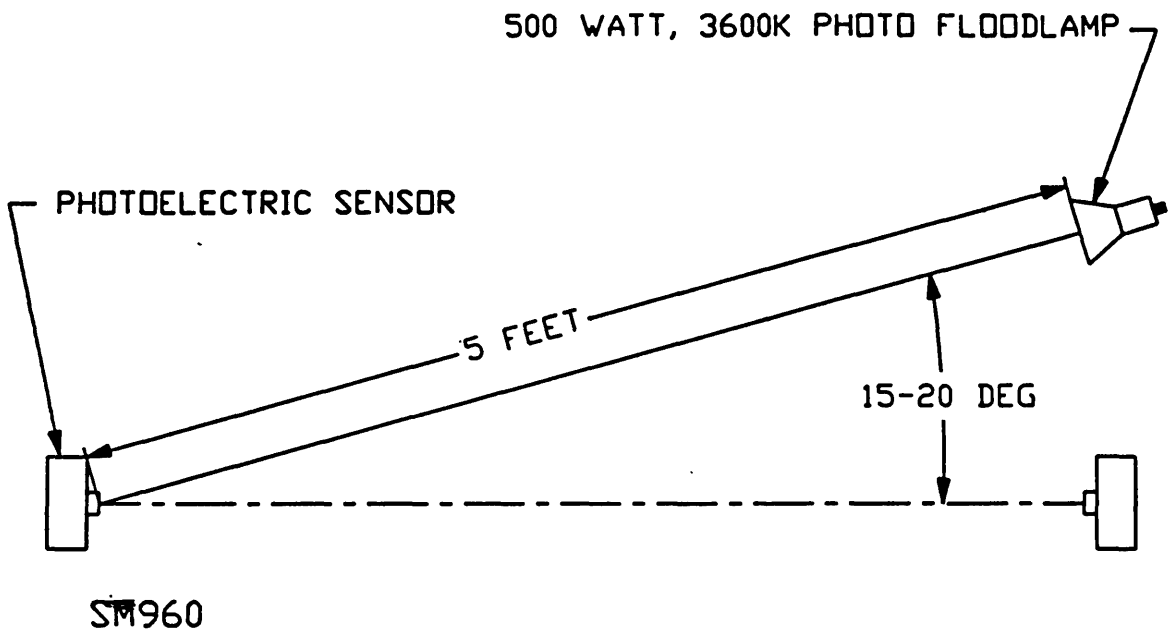
Effective date of 33.2.3 changed from July 16, 1999 to March 1, 2000

33.3 Ambient light test

33.3.1 A photoelectric sensor shall operate as specified in 31.3.1 and 31.3.2 when subjected to ambient light impinging at an angle of 15 to 20 degrees from the axis of the beam when tested according to 33.3.2 and, if appropriate, 33.3.3.

33.3.2 To determine compliance with 33.3.1, a 500 watt, 3600K Photo Floodlamp, type DXC RFL-2, is to be energized from a 120-volt, 60-hertz source. The lamp is to be positioned 5 feet from the front of the receiver and aimed directly at the sensor at an angle of 15 to 20 degrees from the axis of the beam. See Figure 33.3.

Figure 33.3
Ambient light test



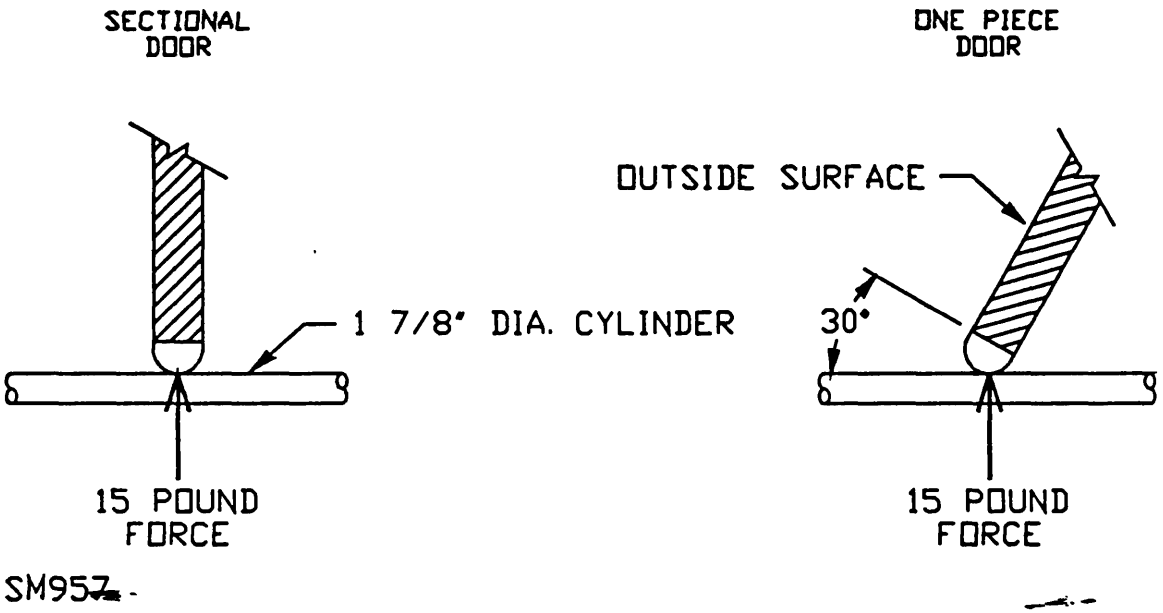
33.3.3 If the photoelectric sensor uses a reflector, this test is to be repeated with the lamp aimed at the reflector.

34 Edge Sensors

34.1 Normal operation test

34.1.1 When installed on a representative door edge, an edge sensor shall actuate upon the application of a 15 pound (66.7 N) or less force in the direction of the application. For an edge sensor intended to be used on a sectional door, the force is to be applied by the longitudinal edge of a 1-7/8 inch (47.6 mm) diameter cylinder placed across the sensor so that the axis is perpendicular to plane of the door. For an edge sensor intended to be used on a one piece door, the force is to be applied so that the axis is at an angle 30 degrees from the direction perpendicular to the plane of the door. See Figure 34.1.

Figure 34.1
Edge sensor normal operation test



34.1.2 With respect to the test of 34.1.1, the test is to be repeated at various representative points of the edge sensor across the width of the door.

Exception: The edge sensor need not be sensitive to actuation 2 inches (50.4 mm) or less from each end of the intended width of the door opening.

34.2 Endurance test

34.2.1 An edge sensor system and associated components shall withstand 30,000 cycles of mechanical operation without failure. For this test, the edge sensor is to be cycled by the repetitive application of the force as described in 34.1.1. The force is to be applied to the same location for the entire test. For an edge sensor system employing integral electric contact strips, this test shall be conducted with the contacts connected to a load no less severe than it controls in the operator. For the last 50 cycles of operation, the sensor shall function as intended when connected to an operator.

34.3 Elastomeric material conditioning test

34.3.1 An elastomeric material used as a functional part of an edge sensor shall function as intended when subjected to:

a) Accelerated Aging Test of Gaskets, Section 44, and

b) Puncture Resistance Test, Section 47.

34.3.2 An elastomeric material used for a functional part that is exposed to outdoor weather conditions when the door is in the closed position shall have physical properties as specified in Table 44.1 after being conditioned in accordance with the Ultraviolet Light Exposure Test described in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

35 Trial Installation

35.1 To determine whether the installation instructions in the instruction manual comply with the requirements in 51.1.1– 51.1.3, 51.3.1, and 51.3.2, a trial installation is to be made using the instruction manual.

Effective date of 35.1 changed from July 16, 1999 to March 1, 2000

42A Inherent Secondary Force Activated Door Sensors

42A.1 Normal operation test

42A.1.1 A force activated door sensor of a door system installed according to the installation instructions shall actuate when the door applies a force of 15 pound (66.7 N) or less in the down or closing direction and when the door applies a force of 25 pound (111.2 N) or less in the up or opening direction. For a force activated door sensor intended to be used in an operator intended for use only on a sectional door, the force is to be applied by the door against the longitudinal edge of a 1-7/8 inch (47.6 mm) diameter cylinder placed across the door so that the axis is perpendicular to the plane of the door. See Figure 34.1. The weight of the door is to be equal to the maximum weight rating of the operator.

42A.1.1 added September 18, 1998

42A.1.2 The test described in 42A.1.1 is to be repeated and measurements made at various representative points across the width and height of the door. For this test, a force activated door sensor system and associated components shall withstand a total of 9 cycles of mechanical operation without failure with the force applied as follows:

a) At the center at points one, three, and five feet (304.8 mm, 914.4 mm and 1.5 m) from the floor,

b) Within 1 foot (304.8 mm) of the end of the door, at points one, three, and five feet from the floor,

c) Within 1 foot of the other end of the door at points one, three, and five feet from the floor.

The cycles are not required to be consecutive. Continuous operation of the motor without cooling is not required.

42A.1.2 added September 18, 1998

42A.2 Adjustment of door weight

42A.2.1 With the door at the point and at the weight determined by the tests of 42A.1.2 and 42A.2.2 to be most severe, the door sensor and associated components shall function as intended after 50 cycles of operation.

42A.2.1 added September 18, 1998

42A.2.2 At the point determined by the test in 42A.1.1 and 42A.1.2 to be the most severe, weight is to be added to the door in 5.0-pound (2.26-Kg) increments and the test repeated until a total of 15.0 pounds (6.78 kg) has been added to the door. Before performing each test cycle, the door is to be cycled 2 times to update the profile. Similarly, starting from normal weight plus 15.0 pounds, the test is to be repeated by subtracting weight in 5.0-pound increments until a total of 15.0 pounds has been subtracted from the door.

42A.2.2 added September 18, 1998

45.5 A mechanical switch or a relay used in an entrapment protection circuit of an operator shall withstand 100,000 cycles of operation controlling a load no less severe (voltage, current, power factor, inrush, and similar ratings) than it controls in the operator, and shall function normally upon completion of the test.

31.1.3 revised and relocated as 45.5 effective March 1, 2000

45.6 In the event malfunction of a switch or a relay (open or short) described in 45.5 results in loss of any entrapment protection required by 30A.1.1, 31.2.1, 31.2.5A, 31.2.6, or 31.3.1, the door or gate operator shall become inoperative at the end of the opening or closing operation; or for a door operator only, the door operator shall move the door to, and stay within, 1 foot (305 mm) of the uppermost position.

31.1.4 revised and relocated as 45.6 effective March 1, 2000

47 Puncture Resistance Test

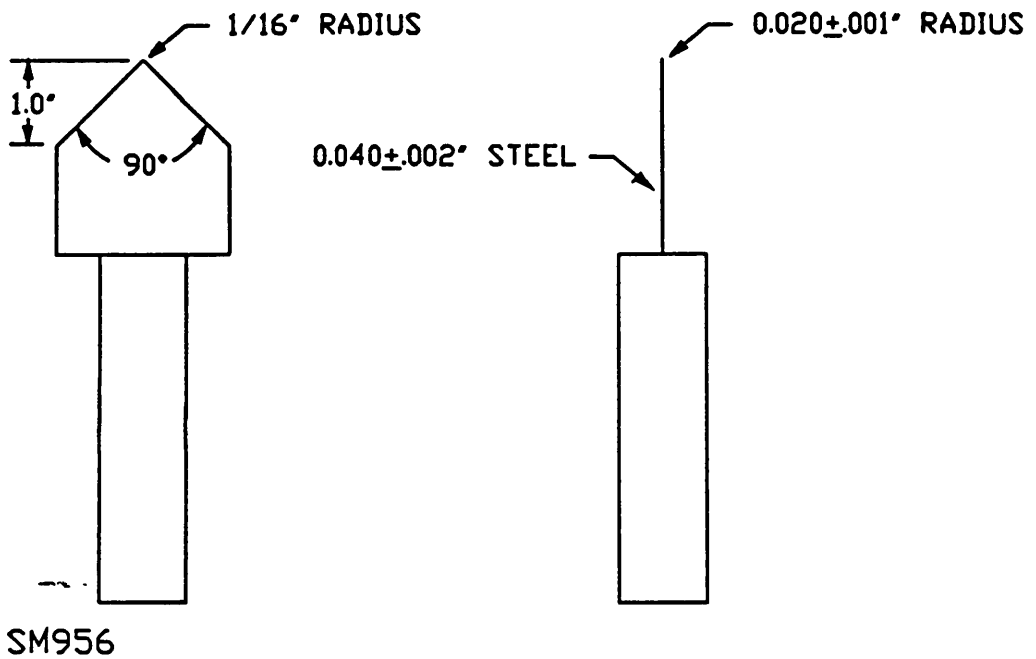
47.1 After being subjected to the test described in 47.2, an elastomeric material that is a functional part of an edge sensor shall:

a) Not be damaged in a manner that would adversely affect the intended operation of the edge sensor, and

b) Maintain enclosure integrity if it serves to reduce the likelihood of contamination of electrical contacts.

47.2 A sample of the edge sensor is to be installed in the intended manner on a representative door edge. The probe described in Figure 47.1 is to be applied with a 20 pound-force (89N) to any point on the sensor that is 3 inches or less above the floor when the door is fully closed. For each type of door, the force is to be applied in the direction specified in the Edge Sensor Normal Operation Test, Figure 34.1. The test is to be repeated on three locations on each surface of the sensor being tested.

Figure 47.1
Puncture probe



47.3 The test is to be repeated on an additional sample cooled to a temperature of 0.0°C (32.0°F) and maintained at this temperature for 3 hours. While the sample is still cold, it is to be subjected to the puncture resistance tests described in 47.1 and 47.2.

48 Permanence of Marking Tests

48.1 A marking that is required to be permanent shall be molded, die-stamped, paint-stenciled, stamped or etched metal that is permanently secured, or indelibly stamped lettering on a pressure-sensitive label secured by adhesive that, upon investigation, is found to be acceptable for the application. Ordinary usage, handling, storage, and the like of a product are considered in the determination of the permanence of a marking.

48.2 Unless rated for the application, a pressure-sensitive label or a label that is secured by cement or adhesive and that is required to be permanent shall comply with the applicable requirements in the Standard for Marking and Labeling Systems, UL 969. The label shall be evaluated for exposure to:

a) High humidity,

b) Occasional exposure to water, and

c) Minimum temperature of minus 40°C (minus 40°F).

A label used on a product or device anticipated to be exposed to the weather shall be evaluated for outdoor use.

48.2 revised September 18, 1998

INSTRUCTION MANUAL

51 Details

51.1 General

51.1.1 An appliance shall be provided with an instruction manual. The instruction manual shall give instructions for the installation, operation, and user maintenance of the appliance.

51.1.7 Where a minimum letter height is specified, the height of the largest letter shall be used to determine letter height, unless stated otherwise. Numbers and all other letters shall be proportional.

51.1.7 added September 18, 1998

51.3 Residential garage doors and door operators

51.3.1 Instructions that clearly detail installation and adjustment procedures required to effect proper operation of the safety means included shall be provided with each door operator.

51.3.2 A residential garage door or door operator shall be provided with complete and specific instructions for the correct adjustment of the control mechanism and the need for periodic checking and, if needed, adjustment of the control mechanism so as to maintain satisfactory operation of the door.

51.3.3 The instruction manual shall include the important instructions specified in 51.4.1 and 51.5.1. All required text shall be legible and contrast with the background. Upper case letters of required text shall be no less than 5/64 inch (2.0 mm) high and Lower case letters shall be no less than 1/16 inch (1.6 mm) high. Headings such as "IMPORTANT INSTALLATION INSTRUCTIONS", "IMPORTANT SAFETY INSTRUCTIONS", "SAVE THESE INSTRUCTIONS" and the words "WARNING - To reduce the risk of severe injury or death to persons:" shall be in letters no less than 3/16 inch (4.8 mm) high.

51.3.4 The instructions listed in 51.4.1 and 51.5.1 shall be in the exact words specified or shall be in equally definitive terminology to those specified. No substitutes shall be used for the word "WARNING". The items may be numbered. The first and last items specified in 51.5.1 shall be first and last respectively. Other important and precautionary items considered appropriate by the manufacturer may be inserted.

51.3.5 The instructions listed in 51.4.1 shall be located immediately prior to the installation instructions. The instructions listed in 51.5.1 shall be located immediately prior to user operation and maintenance instructions. In each case, the instructions shall be separate in format from other detailed instructions related to installation, operation and maintenance of the appliance. All instructions, except installation instructions, shall be a permanent part of the manual(s).

51.4 Installation Instructions

51.4.1 The installation instructions shall include the following or equivalent text:

IMPORTANT INSTALLATION INSTRUCTIONS

WARNING – To reduce the risk of severe injury or death:

1. READ AND FOLLOW ALL INSTALLATION INSTRUCTIONS.

2. Install only on a properly balanced garage door. An improperly balanced door has the potential to inflict severe injury. Have a qualified service person make repairs to cables, spring assemblies, and other hardware before installing the opener.

3. Remove all ropes and remove or make inoperative all locks connected to the garage door before installing opener.

4. Where possible, install the door opener 7 feet or more above the floor. For products having an emergency release, mount the emergency release 6 feet above the floor.

5. Do not connect the opener to source of power until instructed to do so.

6. Locate the control button: (a) within sight of door, (b) at a minimum height of 5 feet so small children are not able to reach it, and (c) away from all moving parts of the door.

7. Install the Entrapment Warning Label next to the control button in a prominent location. Install the Emergency Release Marking. Attach the marking on or next to the emergency release.

8. After installing the opener, the door must reverse when it contacts a 1-1/2 inch high object (or a 2 by 4 board laid flat) on the floor.

51.4.1 revised September 18, 1998

51.5 User Instructions

51.5.1 The user instructions shall include the following or equivalent text:

IMPORTANT SAFETY INSTRUCTIONS

WARNING – To reduce the risk of severe injury or death:

1. READ AND FOLLOW ALL INSTRUCTIONS.

2. Never let children operate or play with door controls. Keep the remote control away from children.

3. Always keep the moving door in sight and away from people and objects until it is completely closed. NO ONE SHOULD CROSS THE PATH OF THE MOVING DOOR.

4. Test door opener monthly. The garage door MUST reverse on contact with a 1-1/2 inch high object (or a 2 by 4 board laid flat) on the floor. After adjusting either the force or the limit of travel, retest the door opener. Failure to adjust the opener properly increases the risk of severe injury or death.

5. For products having an emergency release, when possible, use the emergency release only when the door is closed. Use caution when using this release with the door open. Weak or broken springs are capable of increasing the rate of door closure and increasing the risk of severe injury or death.

6. KEEP GARAGE DOORS PROPERLY BALANCED. See owner's manual. An improperly balanced door increases the risk of severe injury or death. Have a qualified service person make repairs to cables, spring assemblies, and other hardware.

7. SAVE THESE INSTRUCTIONS.

51.5.1 revised September 18, 1998

52 Field Installed Labels

52.1 A residential garage door operator shall be provided with labels for field installation and constructed as specified in 52.3 – 52.9. The labels shall be acceptable for permanent installation. The instruction manual shall specify where the labels are to be located.

52.2 If labels secured by adhesive are used, the instructions shall specify that an additional mechanical means shall be used to secure the labels to surfaces to which the adhesive will not adhere.

52.3 A residential garage door operator shall be provided with a cautionary label intended for permanent installation to identify the possible risk of entrapment. The instruction manual shall direct that the label be affixed near the wall-mounted control button.

52.4 The label required in accordance with 52.3 shall be in a vertical layout with three panels:

a) A signal word panel,

b) A pictorial panel, and

c) A message panel.

Adjacent panels shall be delineated from each other by a bold black line. The entire label shall be surrounded by a black border and shall not be less than 5 inches (127 mm) wide by 6-1/4 inches (159 mm) long overall.

52.4 revised September 18, 1998

52.5 The signal word panel as specified in 52.4 shall contain the word "WARNING," in upper case letters, preceded by a safety alert symbol consisting of an orange exclamation mark on a black solid equilateral triangle background with the point of the triangle oriented upward. The word "WARNING" and the safety alert symbol shall be centered on one line and shall be in black letters at least 7/16 inch (11.1 mm) high on an orange background.

52.6 The pictorial panel as specified in 52.4 shall be positioned between the signal word panel and the message panel. The pictorial shall be black on a white background and shall clearly depict a child running toward or under a garage door. A red prohibition symbol (slash, oriented from the upper left to the lower right, through a circle) shall be superimposed over, and totally surround, the pictorial. The pictorial shall have an overall diameter of 1-7/8 inch (47.6 mm) minimum.

52.7 The message panel specified in 52.4 shall include the following statements and instructions or an equivalent wording:

a) POSSIBLE RISK AND CONSEQUENCE STATEMENT – "There is a risk of a child becoming trapped under an automatic garage door resulting in severe injury or death."

b) AVOIDANCE STATEMENTS:

1) "Do not let children walk or run under a closing door."

2) "Do not let children operate door operator controls."

3) "Always keep a closing door within sight."

4) "In the event a person is trapped under the door, push the control button or use the emergency release."

Exception: For products not having an emergency release, the instructions shall omit "or use the emergency release."

c) INSTRUCTIONS:

1) "Test Door Operator Monthly: Use a 1-1/2-inch high object (or a 2 by 4 board laid flat) on the floor under the closing door. In the event the door does not reverse upon contact, adjust, repair, or replace the operator."

2) Additional instructions on not removing or painting over the label, mounting the label adjacent to the wall control, and mounting the wall control out of children's reach shall be supplied. These additional instructions shall be in less prominent lettering than the lettering for item 1.

52.7 revised September 18, 1998

52.8 The lettering of the message panel described in 52.7 shall be black on a white background and shall be in sans serif letters in combinations of upper case and lower case letters. The upper case letters of the Possible Risk and Consequence Statements and Avoidance Statements shall be 1/8 inch (3.18 mm) high minimum. The lettering of the Possible Risk and Consequence Statement shall be in italics, underlined, bold, or the like, and shall be double spaced from the Avoidance Statements so that it is more prominent than the Avoidance Statements. All other instructions shall be in letters less prominent than the Possible Risk and Consequence Statements and shall be separated with at least a single space between individual instructions.

52.9 A residential garage door operator shall be supplied with a cautionary marking attached to, or adjacent at all times to, the means supplied to detach the operator from the garage door. The marking shall include the following statement or the equivalent: "In the event the door becomes obstructed, detach door from operator as follows: (The method to detach the operator shall be shown on the marking)."

Exception: For a product complying with the Exception to 31.4.1, a cautionary marking is not required.

52.9 revised September 18, 1998

MARKING

53 Details

53.1 General

53.1.1 Unless specifically indicated otherwise, markings required in 53.1.2 – 53.4.8 and elsewhere in this standard shall be permanent in accordance with Permanence of Marking Tests, Section 48.

Revised 53.1.1 effective July 16, 1998

53.1.2 An appliance shall be plainly marked, at a location where the marking shall be readily visible – after installation, in the case of a permanently connected appliance – with:

a) The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product is identified – hereinafter referred to as the manufacturer's name,

b) The catalog number or the equivalent,

c) The voltage, frequency, and input in amperes or watts, and

d) The date or other dating period of manufacture not exceeding any three consecutive months. The ampere rating shall be included unless the full-load power factor is 80 percent or more, or, for a cord-connected appliance, unless the rating is 50 watts or less. The number of phases shall be indicated when an appliance is for use on a polyphase circuit. The date code repetition cycle shall not be less than 20 years.

Exception No. 1: The manufacturer's identification is not restricted from being in a traceable code when the appliance is identified by the brand or trademark owned by a private labeler.

Exception No. 2: The date of manufacture is not restricted from being abbreviated or in an established or otherwise accepted code.

53.1.2 revised September 18, 1998

53.1.3 If a manufacturer produces or assembles appliances at more than one factory, each finished appliance shall have a distinctive marking, which may be in code, to identify it as the product of a particular factory.

53.3 Specific appliances

53.3.1 The carton and the instruction manual for an operator shall be marked with the word "WARNING" and the following or the equivalent: "To reduce the risk of injury to persons – Use this operator only with (a) ____door(s)."

53.3.2 For products with user adjustments, a residential garage door operator shall be marked with the word "WARNING" and the following or equivalent: "Risk of entrapment. After adjusting either the force or limits of travel adjustments, confirm that the door reverses on a 1-1/2 inch (or a 2 by 4 board laid flat) high obstruction on the floor."

53.3.2 revised September 18, 1998

53.3.3 A separately supplied accessory, including an external entrapment protection device, intended for installation with an appliance or appliances shall be marked with the manufacturer's name and catalog or model number and the type of appliance or appliances (such as a residential garage door operator) with which it is intended to be used.

53.3.3 revised September 18, 1998

53.3.4 An appliance provided with terminals or connectors for connection of a separately supplied accessory, such as an external entrapment protection device, shall be marked to identify the accessory intended to be connected to the terminals or connectors. The accessory identification shall be by manufacturer's name and catalog or model number or other means to allow for the identification of accessories intended for use with the appliance.

53.3.5 With reference to 53.3.3, instructions for installing a separately supplied accessory shall be provided. A statement shall be included in the instructions warning the user that the appliance must be disconnected from the source of supply before attempting the installation of the accessory.

53.3.12 A door or door operator as described in 30.1.1(c) shall be provided with a placard that is marked in letters at least 1/4 inch (6.4 mm) high with the word "WARNING" and the following statement or the equivalent: "To Prevent Entrapment – Do not start door downward unless doorway is clear." The placard shall be made of substantially rigid material such as vulcanized fiber, or the equivalent, to provide mechanical strength, and provided with at least two holes for wall mounting.

TAB D

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: April 20, 2000

TO : John R. Murphy, Mechanical Engineer, ES

THROUGH: Warren J. Prunella, AED, EC WJP

FROM : Terrance R. Karels, EC TRK

SUBJECT : Revision of Garage Door Operator Standard

The Commission staff is recommending that the standard for automatic residential garage door operators (GDOs) be revised to conform to revisions in the UL standard for these products. The revisions would accommodate technical advances and newer designs in GDOs. The Commission is required by the Regulatory Flexibility Act of 1980 (RFA) to address and give particular attention to the economic effects of the revisions on small entities. Due to the nature of the revisions, they are unlikely to have any adverse impact on small businesses or other entities.

There are three changes addressing new types of mechanisms to prevent entrapment. One change allows for a system that continuously monitors the position of the door, while another allows for the incorporation of an additional, secondary door sensor to prevent entrapment. The third change exempts GDOs from having a manual release mechanism if they are not directly connected to the door and the door can be easily raised manually. The amendment also includes a revision of the standard's labeling provisions.

The changes are not expected to have a significant impact on a substantial number of small businesses. According to industry sources, there are 22 manufacturers or importers of GDOs; only one of these uses the new mechanisms that would be permitted under the revised standard. With over 1,000 employees, this firm would not be considered a small business under Small Business Administration guidelines. The substantive changes affect only the companies that either use the new designs or may adapt them to future production. No firms would be required to make changes to its products in order to conform to the standard. Any firms that currently comply with UL325 would continue to comply after the technical amendments. The revisions will not render other models obsolete, and are not expected to affect consumer demand.

TAB E

August 15, 2000

Office of The Secretary
Consumer Product Safety Commission
4330 East-West Highway
Room 502
Bethesda, MD 20814-4408

Re: Docket # 00-14697

To Whom It May Concern:

The Consumer Product Safety Commission (CPSC), an agency of the Federal Government, develops safety standards to protect the public against injury from consumer products. It helps consumers evaluate product safety and promotes research into the causes and prevention of product-related injury. The CPSC sets mandatory consumer product standards and requires manufacturers to report defects in products that could create substantial hazards to the public. The Injury Information Clearinghouse collects information about consumer product-related injuries. The Commission conducts education campaigns about product safety and provides technical information to consumers, researchers, and manufacturers.

We feel that it is imperative that manufactures should take the initiative to make it mandatory to install garage doors sensors on all new residential garage doors, in order to prevent future mishaps. Statistics show The CPSC sets mandatory consumer product standards and requires manufacturers to report defects in products that could create substantial hazards to the public. Since 1990, an average of 20,000 people each year have been treated in hospital emergency rooms for injuries related to garage doors. In 1998 to 1995, an estimated 68,380 finger injuries associated with garage doors were treated in hospital emergency rooms, an average of 8,550 finger injuries per year. In 1996 the estimated 8,530 finger injuries associated with garage doors included 190 amputations, 1,000 crushing injuries, and 1,400 fractures. Children accounted for approximately 15 percent of the total 22,431 garage door related injuries reported from January 1982 to December 1985. Sixty children under the

age of 14 have been trapped and killed under automatic garage doors since March 1982.

These accidents often occur when children press the door operator button, and try to run out underneath the door as it is closing. If the door's reversing mechanism does not function correctly, the child ends up trapped beneath the door, which continues to press down on the child. If the child is caught at the neck or chest, death usually results from suffocation.

The current standards further provide that the doors must reverse off a two-inch obstruction that is compressible to one inch. The allowance for that one inch at the bottom end of door travel where the automatic reversal switch may be deactivated is to accommodate small obstructions, such as stones or ice, and for the movement of pavement due to frost.

In practice, depending on installation, adjustment and poor maintenance of the door, a door may have more than one or two inches at bottom end of door travel where the door will automatically reverse. Owners should not assume that because their door goes up and down without any problem, the reversing mechanism also works. It is critical to test the reversing mechanism regularly.

Owners should also be aware that the force exerted by an opener is determined by the condition of the door as well as an adjustable force knob on the unit. Depending on the adjustment of this knob, the force applied to the door will either increase or decrease, thus making reversing easier or harder. If the force is increased, it is possible that a small child trapped underneath a door may not be able to provide sufficient resistance or force to trigger the reversing mechanism. The door will then continue to press against the child until the door is closed and the automatic reversing mechanism is deactivated.

The homeowner may be tempted to set the knob at high levels to compensate for a poorly maintained door. A door that is not, for example, properly balanced, will be hard to move. Since the motor senses this difficulty as blockage, the homeowner may decide simply to adjust the knob to increase the force applied to the door so that premature reversing will not occur. But, at the same time, this means that an obstructing object will also have to exert a greater amount of force on the door to make it reverse. If a child is trapped beneath a door that continues to press down, the door also moves closer to the point where the automatic reversing system will stop functioning.

Experts estimate that a properly balanced door, along with the opener, could exert as little as 14 kilograms of force, in contrast to one that is not balanced and could instead exert from 70 to 190 kilograms of force. A balanced door will stay in place when stopped in any partially opened position. The door should not stick or bind when opened or closed.

In the United States, a federal law has made it mandatory that another safety feature be added to openers manufactured after January 1, 1993. A number of entrapment protection devices are being considered, including photoelectric sensors and door edge sensors. The implementation of a secondary entrapment device it is not only necessary, but long overdue. The general public would welcome any measurements taken to save someone's life; even if this means paying more for the garage doors. Garage doors should be equipped with external photoelectric sensor that when activated results in an operator that is closing door to reverse direction of the door. An external edge sensor that when activated results in an operator that is closing a door to reverse directions.

A team of Twin City doctors is recommending that homeowners test electric garage door openers for resistance by using a roll of paper towels instead of a block of wood. In an article published in a medical pediatrics journal, the doctors stated that the resistance of a child's head and neck is much more like that of soft towels than wood. "Standards for automatic garage-door openers before 1993 probably were not adequate to prevent injury and death to children" the article says. Robert Kriel, Mark Gormley and Linda Krach, all of whom practice at Hennepin County Medical Centerr in Minneapolis and Gillette Children's Specialty Healthcare in St Paul, conducted a national study of more than 85 children severely injured between 1974 and 1995 when trapped under garage doors. About 87 percent of the children in the survey died; the others had permanent brain damage. The researchers and a co-author lawyer Shawn Bartsh of St Paul, estimate that only half of the serious garage door cases are reported to authorities.

Since 1993, federal law has required that door openers reverse if they strike an object as they close and also required additional safety devices such as electric eyes. Even new doors can be hazardous if they are improperly installed, are broken or have their force adjusted to close even when snow and ice are on the ground. The researchers suggest that all garage door openers be tested monthly. Kriel and Gormley became concerned after treating a series of children injured or killed by door

openers. They began testing doors. Even those of hospital employees, who tend to be safety-conscious, failed in large numbers. Their evaluation of 50 door openers showed that while 88 percent reversed when encountering a block of wood, 40 percent failed to reverse when coming down on a mannequin. They experimented with common household items such as cantaloupes. They found that the object that best replicated a child's resistance to a garage door was a large wrapped roll of paper towels. If a door does not reverse when it hits the roll, it is likely to greatly injure a child they concluded.

A door that fails to reverse should be disconnected by the homeowner and operated manually until the opener is serviced or replaced with one that meets the latest Underwriters Laboratory standards, they say. The researchers recommend certain steps to take in safety measure. Parents should talk to their children about garage door dangers. Adults need to tell children got to play near them. A garage door can be as dangerous as a swimming pool in the back yard. They should make the opening mechanism inaccessible to young children. Also they should mount the opener high in the garage, and a lock cars that have openers inside. It is important to make sure that the door has shut or opened completely before you walk away from it. Never walk under a closing door; children may mimic your actions. It is good to test openers once a month, even those with electric eyes. /manufacturers should also do a better job of warning consumers and government units. They should require that garage doors be inspected when home ownership is transferred. Adults also have been killed and injured by garage doors (usually when hit on the head by a closing door). But they were not included in the study.

We are making the following suggestions for Homeowners. Read and be familiar with the safety, operation, and maintenance information found in the owner's manual. Contact the manufacturer for a copy if you do not have one. All moving parts of a garage door require periodic lubrication. A few drops of lightweight household oil or spray silicone lubricant can be used. Openers should be inspected and tested at least once a month. Test the door and opener by placing a one-centimeter high object on the floor in the door's path. When operating properly, an automatic opener should stop and reverse the closing door within two seconds of striking the object.

A second safety feature ensures that once the close button is pressed, the door must reach bottom within 30 seconds or reverse. It is important to test the door with a small object on the floor and not just with your hands at waist level. It is possible for the opener to reverse at higher levels, but not reverse at the lower levels. If the door does not reverse, adjustments,

repairs or replacements are needed. Call a qualified door technician to make repairs or consult the owner's manual. If the door is an older model (before 1982), it is also possible that a high setting on the reverse force adjustment knob may prevent the reversing mechanism to function at some of the highest levels. Disconnect and replace an automatic door opener that does not have a safety feature, which causes it to reverse when it strikes an object. Place remote controls or push button openers out of children's reach. Caution children that running under a closing door can be deadly. Do not use the remote control device unless you have a clear view of the garage door. Be aware of warning signs such as parts that look or sound different when the door is operating. Test and know how to use the release mechanism on the door. See the owner's manual for details.

We contacted several manufacturers in the United States. Our research indicated that they are conforming with the regulations of the Consumer Safety Product Commission. One way is to ensure that consumers are testing garage doors at least once a month. We are suggesting that the manufacturer maintains a database of automatic garage doors and periodically call their customers to remind them that it is time to inspect their garage doors. In a case that the door is closing, it reverses for no apparent reason and the opener's light bulb blinks for five seconds, the manufacturer suggests to do the following:

1. *The key to troubleshooting this problem is the garage door opener's light bulb flashing 10 times for a total of five seconds. The flashing indicates the opener was manufactured after January 1, 1993 and includes the federally mandated Protector System, the electric-eye safety reversing sensors. These sensors are found four to six inches above the garage floor protecting the opening with an invisible beam sent from one side (the sending unit), to a receiving sensor on the opposite side of the door opening.*

2. *Both sensors have a small LED light to help us align and troubleshoot the eyes. One sensor is labeled as sender and the other one as receiver. The sender LED light will glow regardless of alignment or obstruction. In situations where the openers and sensors have been accidentally bumped out of alignment. Look for the obvious misaligned sensor and realign. Once realigned, the receiving eye LED light will now glow steadily.*

3. *Remember that this is an invisible beam sent from one side and received by the other side, that keeps the garage door opener informed if the door opening is clear and safe. It is important in understanding the alignment issue. As the door is closing, any obstruction to the invisible beam path will command the opener to reverse to the fully open position and flash the opener light bulb 10 times as a warning.*

4. *Always after adjusting the sensors, the opener itself or the door, test both reversing systems, the safety sensors and the on board opener reversing system. To test the safety sensors with the door open, press the remote control or pushbutton to close the door. Break the beam using your hand or a carton. The door should immediately reverse to a fully open position and the opener bulb will flash 10 times.*

5. *Next, place a one inch board (or 2 X 4 laid flat) on the floor, centered under the garage door. Operate the door in the down direction. The door must reverse on striking the board. If it does not, refer to your owner's manual. Failure to pass the above tests could result in serious injury or death.*

Please remember to repeat this test once a month.

In addition, all newly manufactured garage door openers must include a sticker warning consumers of the potential entrapment hazard. The sticker is to be placed near the wall mounted control button.

As concerned citizens, we are deeply troubled by the way automated garage door opener manufacturers have gone about in dealing with these tragic situations. We feel that it is the responsibility of garage door manufacturers to work together with the Consumer Product Safety Commission to take the necessary precautions to better safeguard its consumers from injuries and risks that are caused by entrapment. The way that this would be accomplished is by making a mandatory standard of including both the external safety device and the constant contact control button (which is a wall-mounted button requiring a person to hold in the control button continuously for the door to close completely. If the button is released before the door closes, the door would reverse and open to the

highest position. The remote control transmitter will not close the door with this option.) on all automatic residential garage doors. In addition to the manual, manufacturers should include videotape referring to the precautions and proper use of the automatic garage door openers.

Thank you for giving us the opportunity to voice our opinions on this crucial issue.

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TAB F

[Billing Code 6335-01] DRAFT 10/26/00

CONSUMER PRODUCT SAFETY COMMISSION

Safety Standard for Automatic Residential Garage Door Operators

16 CFR Part 1211

AGENCY: Consumer Product Safety Commission.

ACTION: Final rule.

SUMMARY: The Consumer Product Safety Commission is amending 16 CFR part 1211, Safety Standard for Automatic Residential Garage Door Operators, to reflect changes made by Underwriters Laboratories, Inc. in its standard UL 325.

DATE: The rule will become effective on _____ [Insert date 30 days from date of publication in the FEDERAL REGISTER].

FOR FURTHER INFORMATION CONTACT: Renae Rauchschwalbe, Office of Compliance, Consumer Product Safety Commission, Washington, DC 20207, telephone 301-504-0608, ext. 1362.

SUPPLEMENTARY INFORMATION: The Commission issued part 1211 on December 21, 1992 to minimize the risk of entrapment by residential garage door openers. As mandated by section 203 of Public Law 101-608, subpart A of part 1211 codifies garage door operator entrapment provisions of Underwriter Laboratories, Inc. ("UL") standard UL 325, third edition, "Door, Drapery, Louver and Window Operators and Systems." Subparagraph (c) of section 203 of Pub. L. 101-608 also required the Commission to incorporate into part 1211 any

revisions that UL proposed to the entrapment protection requirements of UL 325, unless the Commission notified UL that the revision does not carry out the purposes of Pub. L. 101-608.

UL proposed revisions to UL 325 on June 30, 1998, and made them final on September 18, 1998. The Commission determined that the entrapment related revisions do carry out the purposes of Public Law 101-608. On June 14, 2000, the Commission proposed a rule incorporating into subpart A of part 1211 those revisions that relate to entrapment by residential automatic garage door operators and also correcting a few typographical errors in part 1211. 65 FR 37318. The Commission received one comment on the proposed rule from six students at Florida International University. Their comment discussed generally the entrapment hazard posed by garage doors and precautions that garage door owners should take. They suggested a mandatory standard requiring both an external entrapment-sensing safety device and a constant contact control button. However, this would mean that the consumer would have to stand in the garage at the button until the door is completely closed. Aside from the inconvenience of such a requirement, it is beyond the scope of this rulemaking, the narrow purpose of which is to revise the existing Commission standard to reflect recent changes to UL 325.

The changes to the UL standard allow for advances in

the state of the art in garage door safety. Some new garage door operators have an inherent entrapment protection system that can continuously monitor the position of the door. The UL revisions add requirements for this type of system. Some new garage door operators have an inherent secondary door sensor that is independent of the primary entrapment protection system. The UL revisions add requirements for this type of new system. Finally, the UL standard adds some new and revised provisions concerning instructions and field installed labels. The final rule incorporates these changes into the CPSC mandatory standard.

Pursuant to section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Commission certifies that this rule will not have a significant impact on a substantial number of small entities. Most of the changes are editorial and minor. The substantive changes only affect the few companies that are developing the new type of garage door operators discussed above. Moreover, UL has already made these changes to its UL 325 standard which is widely followed by the industry. The Commission also certifies that this rule will have no environmental impact. The Commission's regulations state that safety standards for products normally have little or no potential for affecting the human environment. 16 CFR 1021.5(c)(1). Nothing in this rule alters that expectation.

Public Law 101-608 contains a preemption provision. It

states: "those provisions of laws of States or political subdivisions which relate to the labeling of automatic residential garage door openers and those provisions which do not provide at least the equivalent degree of protection from the risk of injury associated with automatic residential garage door openers as the consumer product safety rule" are subject to preemption under 15 U.S.C. 2075. Pub. L. 101-608, section 203(f).

The rule will become effective 30 days from publication in the **Federal Register** and will apply to garage door operators entering the chain of distribution on or after that date. The 30-day effective date is appropriate because the substantive changes affect only a few companies and they are identical to changes already made to UL 325, which is widely followed by the industry.

List of Subjects in 16 CFR Part 1211

Consumer protection, imports, labeling, reporting and recordkeeping requirements

Accordingly, 16 CFR part 1211 is amended as follows:

PART 1211--SAFETY STANDARDS FOR AUTOMATIC RESIDENTIAL GARAGE DOOR OPENERS

1. The authority citation for part 1211 is revised to read as follows:

Authority: Sec. 203 of Pub. L. 101-608, 104 Stat. 3110;

15 U.S.C. 2063 and 2065.

2. In § 1211.2(c) remove the word "1993" and add, in its place "1999".

3. In the first sentence of § 1211.3 remove the words "as given in these requirements" and "an equivalent" and add the word "a" between the words "by" and "value".

4. Section 1211.4 is amended as follows:

a. In § 1211.4(c) remove the words "1st ed., dated July 19, 1991" and add, in their place "second edition, dated June 23, 1995".

b. In § 1211.4(c) add "5" before "U.S.C.".

5. Section 1211.5 is amended as follows:

a. In § 1211.5(a) and (b)(3) remove the words "1st ed., dated July 19, 1991" and add, in their place "second edition, dated June 23, 1995".

b. Revise paragraphs (a)(1), (a)(6), and (a)(7); and add a new paragraph (a)(9) to read as follows:

§ 1211.5 General testing parameters.

(a) * * *

(1) With regard to electrical supervision of critical components, an operator being inoperative with respect to downward movement of the door meets the criteria for trouble indication.

* * * * *

(6) When a Computational Investigation is conducted, λ_p shall not be greater than 6 failures/10^6 hours for the

entire system. For external secondary entrapment protection devices that are sold separately, λ_p shall not be greater than 0 failures/10^6 hours. For internal secondary entrapment protection devices whether or not they are sold separately, λ_p shall not be greater than 0 failures/10^6 hours. The operational test is conducted for 14 days. An external secondary entrapment protection device that is sold separately, and that has a λ_p greater than 0 failures/10^6 hours meets the intent of the requirement when for the combination of the operator and the specified external secondary entrapment protection device λ_p does not exceed 6 failures/10^6 hours. See § 1211.15(i) and (k).

(7) When the Demonstrated Method Test is conducted, the multiplier is to be based on the continuous usage level, and a minimum of 24 units for a minimum of 24 hours per unit are to be tested.

(8) * * *

(9) For the Electrical Fast Transient Burst Test, test level 3 is to be used for residential garage door operators.

* * * * *

6. Section 1211.6 is amended by revising paragraphs (a), (b), (b)(ii), (b)(iii), (b)(2), adding a new paragraph (b)(3), revising paragraphs (c) and (d), and removing paragraph (e) to read as follows:

§ 1211.6 General entrapment protection requirements.

(a) A residential garage door operator system shall be

provided with primary inherent entrapment protection that complies with the requirements as specified in § 1211.7.

(b) In addition to the primary inherent entrapment protection as required by paragraph (a) of this section, a residential garage door operator shall comply with one of the following:

(1) * * *

(i) * * *

(ii) Reverse direction and open the door to the upmost position when constant pressure on a control is removed prior to operator reaching its lower limit, and

(iii) Limit a portable transmitter, when supplied, to function only to cause the operator to open the door;

(2) Shall be provided with a means for connection of an external secondary entrapment protection device as described in § 1211.8, 1211.10, and 1211.11; or

(3) Shall be provided with an inherent secondary entrapment protection device as described in § 1211.8, 1211.10, and 1211.12.

(c) A mechanical switch or a relay used in an entrapment protection circuit of an operator shall withstand 100,000 cycles of operation controlling a load no less severe (voltage, current, power factor, inrush and similar ratings) than it controls in the operator, and shall function normally upon completion of the test.

(d) In the event malfunction of a switch or relay (open

or short) described in paragraph (c) of this section results in loss of any entrapment protection required by §§ 1211.7(a), 1211.7(f), or 1211.8(a), the door operator shall become inoperative at the end of the opening or closing operation, the door operator shall move the door to, and stay within, 1 foot (305 mm) of the uppermost position.

7. Revise Section 1211.7 to read as follows:

§ 1211.7 Inherent entrapment protection requirements.

(a) Other than the first 1 foot (305mm) of travel as measured over the path of the moving dor, both with and without any external entrapment protection device functional, the operator of a downward moving residential garage door shall initiate reversal of the door within 2 seconds of contact with the obstruction as specified in paragraph (b) of this section. After reversing the door, the operator shall return the door to, and stop at, the full upmost position, unless an inherent entrapment circuit senses a second obstruction or a control is actuated to stop the door during the upward travel. Compliance shall be determined in accordance with paragraphs (b) through (i) of this section.

(b) A solid object is to be placed on the floor of the test installation and at various heights under the edge of the door and located in line with the driving point of the operator. When tested on the floor, the object shall be 1 inch (25.4 mm) high. In the test installation, the bottom

edge of the door under the driving force of the operator is to be against the floor when the door is fully closed. For operators other than those attached to the door, the solid object is to be located at points at the center, and within 1 foot of each end of the door.

(c) An operator is to be tested for compliance with paragraph (a) of this section for 50 open-and-close cycles of operation while the operator is connected to the type of residential garage door with which it is intended to be used or with the doors specified in paragragh (e) of this section. For an operator having a force adjustment on the operator, the force is to be adjusted to the maximum setting or at the setting that represents the most severe operating condition. Any accessories having an effect on the intended operation of entrapment protection functions that are intended for use with the operator, are to be attached and the test is to be repeated for one additional cycle.

(d) For an operator that is to be adjusted (limit and force) according to instructions supplied with the operator, the operator is to be tested for 10 additional obstruction cycles using the solid object described in paragraph (b) of this section at the maximum setting or at the setting that represents the most severe operating condition.

(e) For an operator that is intended to be used with more than one type of door, one sample of the operator is to be tested on a sectional door with a curved track and one

sample is to be tested on a one-piece door with jamb hardware and no track. For an operator that is not intended for use on either or both types of doors, a one-piece door with track hardware or a one-piece door with pivot hardware shall be used for the tests. For an operator that is intended for use with a specifically dedicated door or doors, a representative door or doors shall be used for the tests. See the marking requirements at § 1211.16 of this subpart.

(f) An operator, using an inherent entrapment protection system that monitors the actual position of the door, shall initiate reversal of the door and shall return the door to, and stop the door at, the full upmost position in the event the inherent door operating "profile" of the door differs from the originally set parameters. The entrapment protection system shall monitor the position of the door at increments not greater than 1 inch (25.4 mm). The door operator is not required to return the door to, and stop the door at, the full upmost position when an inherent entrapment circuit senses an obstruction or a control is actuated to stop the door during the upward travel.

(g) An operator, using an inherent entrapment protection system that does not monitor the actual position of the door, shall initiate reversal of the door and shall return the door to and stop the door at the full upmost position, when the lower limiting device is not actuated in

30 seconds or less following the initiation of the close cycle. The door operator is not required to return the door to and stop at the full upmost position when an inherent entrapment circuit senses an obstruction or a control is actuated to stop the door during the upward travel. When the door is stopped manually during its descent, the 30 seconds shall be measured from the resumption of the close cycle.

(h) To determine compliance with paragraph (f) or (g) of this section, an operator is to be subjected to 10 open-and-close cycles of operation while connected to the door or doors specified in paragraphs (c) and (e) of this section. The cycles are not required to be consecutive. Motor cooling-off periods during the test meet the intent of the requirement. The means supplied to comply with the requirement in paragraph (a) of this section and § 1211.8(a) are to be defeated during the test. An obstructing object is to be used so that the door is not capable of activating a lower limiting device.

(i) During the closing cycle, the system providing compliance with §§ 1211.7(a) and 1211.7(f) or 1211.7 (a) and 1211.7(g) shall function regardless of a short- or open-circuit anywhere in any low-voltage external wiring, any external entrapment devices, or any other external component.

8. Section 1211.8 is amended by revising the title of §

1211.8, paragraphs (a), (b) and (c), and adding paragraph (d) to read as follows:

§ 1211.8 Secondary entrapment protection requirements.

(a) A secondary entrapment protection device supplied with, or as an accessory to, an operator shall consist of:

(1) An external photoelectric sensor that when activated results in an operator that is closing a door to reverse direction of the door and the sensor prevents an operator from closing an open door,

(2) An external edge sensor installed on the edge of the door that, when activated results in an operator that is closing a door to reverse direction of the door and the sensor prevents an operator from closing an open door,

(3) An inherent door sensor independent of the system used to comply with § 1211.7 that, when activated, results in an operator that is closing a door to reverse direction of the door and the sensor prevents an operator from closing an open door, or

(4) Any other external or internal device that provides entrapment protection equivalent to subparagraphs (a)(1), (a)(2), or (a)(3) of this section.

(b) With respect to paragraph (a) of this section, the operator shall monitor for the presence and correct operation of the device, including the wiring to it, at least once during each close cycle. In the event the device is not present or a fault condition occurs which precludes

the sensing of an obstruction, including an open or short circuit in the wiring that connects an external entrapment protection device to the operator and device's supply source, the operator shall be constructed such that:

(1) A closing door shall open and an open door shall not close more than 1 foot (305 mm) below the upmost position, or

(2) The operator shall function as required by § 1211.6(b)(1).

(c) An external entrapment protection device shall comply with the applicable requirements in §§ 1211.10, 1211.11 and 1211.12 of this subpart.

(d) An inherent secondary entrapment protection device shall comply with the applicable requirements in § 1211.13. Software used in an inherent entrapment protection device shall comply with UL 1998 Standard for Safety-Related Software, Second Edition, May 29, 1998. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096. Copies may be inspected at the Consumer Product Safety Commission, Office of the Secretary, 4330 East West Highway, Bethesda, Maryland or at the Office of the Federal Register, 800 North Capitol Street, N.W. suite 700, Washington, D.C.

9. Section 1211.9 is amended by revising paragraph (a),

redesignating paragraphs (b) and (c) as paragraphs (c) and (d) respectively, and adding a new paragraph (b) to read as follows:

§ 1211.9 Additional entrapment protection.

(a) A means to manually detach the door operator from the door shall be supplied. The gripping surface (handle) shall be colored red and shall be easily distinguishable from the rest of the operator. It shall be capable of being adjusted to a height of 6 feet (1.8 m) above the garage floor when the operator is installed according to the instructions specified in § 1211.14(a)(2). The means shall be constructed so that a hand firmly gripping it and applying a maximum of 50 pounds (223 N) of force shall detach the operator with the door obstructed in the down position. The obstructing object, as described in § 1211.7(b), is to be located in several different positions. A marking with instructions for detaching the operator shall be provided as required by § 1211.15(i).

(b) A means to manually detach the door operator from the door is not required for a door operator that is not directly attached to the door and that controls movement of the door so that:

(1) The door is capable of being moved open from any position other than the last (closing) 2 inches (50.8 mm) of travel, and

(2) The door is capable of being moved to the 2-inch

point from any position between closed and the 2-inch point.

* * * * *

10. Section 1211.10 is amended as follows:

a. In the first sentence of paragraph (a)(3), after the word "minimum" add the words "and maximum"; at the beginning of the second sentence add the words "For doors," and change the word "If" to "if".

b. In the first sentence of paragraph (c)(2) remove the initial word "An" and change the suceeding word "external" to "External"; remove the word "device" and add, in its place the word "devices"; remove the word "is" and add, in its place the word "are".

c. In paragraphs (d) and (e)(2), remove the words "3rd ed., dated July 1, 1991" and add, in their place "4th ed., dated December 27, 1995".

d. In paragraph (d), second sentence, insert "5 " before "U.S.C"

e. In paragraph (e)(1), second sentence, remove the words "After being subjected to this" and add, in their place the words "As a result of the".

f. In paragraph (e)(1)(ii), add at the end thereof and before the period the words "or, if dislodged after the test, is capable of being restored to its original condition".

11. Section 1211.12 is amended as follows:

a. In paragraph 1211.12(c)(2), first sentence, remove

the words "3rd ed., dated July 1, 1991" and add in their place "4th ed., dated December 27, 1995".

b. In paragraph 1211.12(c)(2), second sentence, insert "5" before "U.S.C."

12. Redesignate sections 1211.13 through 1211.16 as sections 1211.14 through 1211.17, respectively, and add a new section 1211.13 to read as follows:

§ 1211.13 Inherent force activated secondary door sensors.

(a) Normal operation test. (1) A force activated door sensor of a door system installed according to the installation instructions shall actuate when the door applies a 15 pound (66.7 N) or less force in the down or closing direction and when the door applies a 25 pound (111.2 N) or less force in the up or opening direction. For a force activated door sensor intended to be used in an operator intended for use only on a sectional door, the force is to be applied by the door against the longitudinal edge of a 1-7/8 (47.6 mm) diameter cylinder placed across the door so that the axis is perpendicular to the plane of the door. See Figure 6. The weight of the door is to be equal to the maximum weight rating of the operator.

(2) The test described in section 1211.13(a)(1) is to be repeated and measurements made at various representative points across the width and height of the door. For this test, a door sensor system and associated components shall withstand a total of 9 cycles of mechanical operation

without failure with the force applied as follows:

(i) At the center at points one, three, and five feet from the floor,

(ii) Within 1 foot of the end of the door, at points one, three, and five feet from the floor,

(iii) Within 1 foot of the other end of the door at points one, three, and five feet from the floor.

The cycles are not required to be consecutive. Continuous operation of the motor without cooling is not required.

(b) Adjustment of door weight. (1) With the door at the point and at the weight determined by the tests of paragraphs (a)(2) and (b)(2) of this section to be the most severe, the door sensor and associated components shall withstand 50 cycles of operation without failure.

(2) At the point determined by the test in paragraphs (a)(1) and (a)(2) of this section to be the most severe, weight is to be added to the door in 5.0 pound (2.26 Kg) increments and the test repeated until a total of 15.0 pounds (66.72 N) has been added to the door. Before performing each test cycle, the door is to be cycled 2 times to update the profile. Similarly, starting from normal weight plus 15.0 pounds, the test is to be repeated by subtracting weight in 5.0 pound increments until a total of 15.0 pounds has been subtracted from the door.

13. Redesignated section 1211.14 is amended as follows:

a. In paragraph (a)(4), third sentence, remove the word "that" and add in its place "than".

b. In paragraph (b)(1) remove the initial word "If" (in paragraph 4 of the installation instructions) and add, in its place "Where"; remove the word "Mount" and add, in its place "For products requiring an emergency release, mount".

c. In paragraph (b)(2), in the second sentence of paragraph 4 of the safety instructions, remove the number "1" and add in its place the number "1 ½".

d. In paragraph (b)(2) before the initial word "If" (in paragraph 5 of the safety instructions), add "For products requiring an emergency release," and change the word "If" to "if".

14. Redesignated section 1211.15 is amended as follows:

a. In paragraph (g)(1) remove the words "A child may become" and add, in their place "There is a risk of a child becoming".

b. In paragraph (g)(2)(iv) remove the first word "If" and add, in its place "In the event".

c. In paragraph (g)(2)(iv) add a second sentence to read "For products not having an emergency release use instead 'In the event a person is trapped under the door, push the control button'".

d. In paragraph (g)(3)(i) in the second sentence, remove the word "If" and add it its place "In the event".

e. In paragraph (i) remove the initial word "A" and add, in its place "Except for door operators complying with § 1211.9(b) of this part, a".

Dated: _____

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Sadye E. Dunn, Secretary
Consumer Product Safety Commission