

## § 1211.6

downward movement of the door meets the criteria for trouble indication.

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

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

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

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

(6) When a Computational Investigation is conducted,  $\lambda_p$  shall not be greater than 6 failures/10<sup>6</sup> hours for the entire system. For external secondary entrapment protection devices that are sold separately,  $\lambda_p$  shall not be greater than 0 failures/10<sup>6</sup> hours. For internal secondary entrapment protection devices whether or not they are sold separately,  $\lambda_p$  shall not be greater than 0 failures/10<sup>6</sup> hours. The operational test is conducted for 14 days. An external secondary entrapment protection device that is sold separately, and that has a  $\lambda_p$  greater than 0 failures/10<sup>6</sup> hours meets the intent of the requirement when for the combination of the operator and the specified external secondary entrapment protection device  $\lambda_p$  does not exceed 6 failures/10<sup>6</sup> 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 hours per unit are to be tested.

(8) The Endurance test is to be conducted concurrently with the Operational test. The control shall perform its intended function while being conditioned for fourteen 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.

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

(b) In the evaluation of entrapment protection circuits used in residential garage door operators, the critical con-

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dition flow chart shown in figure 1 shall be used:

(1) To conduct a failure-mode and effect analysis (FMEA);

(2) In investigating the performance during the Environmental Stress Tests; and

(3) During the Power Cycling Safety for Tests in accordance with the Standard for Safety for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991, second edition, dated June 23, 1995. 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 Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112, Telephone (800) 854-7179 or Global Engineering Documents, 7730 Carondelet Ave., Suite 470, Clayton, MO 63105, Telephone (800) 854-7179. Copies may be inspected at the Consumer Product Safety Commission, Office of the Secretary, 4330 East West Highway, Bethesda, Maryland or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

[57 FR 60455, Dec. 21, 1992, as amended at 62 FR 46667, Sept. 4, 1997; 65 FR 70657, Nov. 27, 2000]

### § 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) Shall be constructed to:

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

(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

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(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.

[57 FR 60455, Dec. 21, 1992, as amended at 65 FR 70657, Nov. 27, 2000]

### § 1211.7 Inherent entrapment protection requirements.

(a) Other than the first 1 foot (305mm) 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 paragraph (b) of this section. After reversing the door, the operator shall return the door to, and stop at, the full uppermost 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 paragraph (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.