

Standard Information

Standard Number: CSA C22.2 No. 139-13

Standard Name: Electrically operated valves

Standard Edition and Issue Date: 4th Edition Dated December 1, 2013

Date of Revisions: December 1, 2013

Date of Previous Revisions to Standard: 3rd Edition Dated June 1, 2010

Effective Date of New/Revised Requirements

Effective Date (see Processing Schedule below): **November 1, 2016**

Impact, Overview, Fees and Action Required

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revised requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date of **November 1, 2016** unless the product is found to comply with new/revised requirements.

Overview of Changes: New construction and test requirements for flammable, hazardous fluids and safety valves, actuators, motors, printed wiring boards, and revised marking requirements. Specific details of new/revised requirements are found in table below.

Processing Schedule: So that production of products bearing Listing Marks will not be interrupted, the following schedule of **approximate** dates has been established to ensure Listing Reports are found compliant by Effective Date:

- March 1, 2016 = 8 Month Report Review – Intertek will review all Reports. Update if compliance is verified or issue Findings Letter/Quote for any re-evaluations needed
- May 2, 2016 = 6 Month Quote Cut-off – Quotes returned for necessary re-evaluations
- October 3, 2016 = 30 Day Warning – Client advised of all non-compliant Reports to be Suspended
- **November 1, 2016** = Effective Date – ATM Suspended for all non-compliant Reports

Fees: An initial review of Listing Report (s) will be covered by a direct billing project and will be invoiced at not more than \$1000 per report.

Client Action Required:

Information – To assist our Intertek Engineer with review of your Certification Reports, please submit technical information in response to the new/revised paragraphs noted in the attached or explain why these new/revised requirements not apply to your product (s).

Current Listings Not Active? – *Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.*

Description of New/Revised Technical Requirements

Clause	Verdict	Comment
-	-	Changes that have been added are identified by <u>underline</u> . Changes that have been deleted are identified by strikeout .
1.3		This Standard also applies to electrically powered mechanisms that are designed to provide the signals needed for monitoring valve operation from a remote location and to electrically powered valve actuators* that are designed to be fitted to valves, except for (a) those utilizing 1/2 hp or larger motors; or (b) those intended for use on valves connected in larger than 3-inch pipe size systems. * For convenience the term valve includes valve actuator unless otherwise stated.
1.7		This Standard does not apply to water valves of connection size larger than 2-inch pipe size or pressure rating above 1600 kPa (232 psi) <u>for valve bodies of thermo plastic material.</u>
1.8		The values given in SI units are the units of record for the purposes of this Standard. The values given in parentheses are for information and comparison only. <u>Electrically operated damper actuators are evaluated to the requirements of CSA C22.2 No. 24.</u>
1.9		In CSA standards, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the standard. <u>The values given in SI units are the units of record for the purposes of this Standard. The values given in parentheses are for information and comparison only.</u>
5.1.1		Electrical components of valves shall conform to the Standard or Standards of the Canadian Electrical Code, Part II, applicable to the components so far as they apply, and shall be suitable for the application. <u>Components used in valves and actuators shall comply with the applicable Canadian Electrical Code Part II standards as specified in the Canadian Electrical Code Part I.</u>

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5.1.6		<p>An electronic or solid-state circuit performing a safety function shall comply with applicable tests and evaluation methods given in CSA C22.2 No. 0.8.</p> <p>Note: <i>An electric valve actuator used as a component in a system-controlling air-gas ratio is considered as a safety control performing a safety function.</i></p> <p>Safety valves shall be assessed to the following as applicable:</p> <p>a) <u>Safety valves and actuators shall comply with the declared timings for operation (travel time, response time, etc).</u></p> <p>b) <u>Remote devices, wired or wireless, performing safety functions shall be evaluated to Clause 5 and the applicable clauses of CSA C22.2 No. 0.8.</u></p> <p>c) <u>Remote functions shall not override the safety functions performed by the valve or actuator.</u></p> <p>d) <u>An electric valve actuator used as a component in a system-controlling air-gas ratio (fuel gas) is considered as a safety control performing a safety function and shall be evaluated as a Class C control.</u></p>
5.2.2.2		<p>Non-metallic material for a valve body or enclosure shall be judged based on the acceptability of the following <u>and comply with the applicable requirements of Clause 7:</u></p> <p>a) mechanical resistance to impact;</p> <p>b) resistance to distortion and creeping at the declared temperatures; and</p> <p>c) operating conditions for end-use application.</p>
5.4.6		<p>Added New Clause</p> <p>If threaded connections to pipe are provided in the assembly, the threads shall conform to ANSI/ASME B1.20.1.</p> <p>Connection sizes greater than 3 in shall be provided with flanged connections suitable for the application. Flanges shall comply with the dimensional requirements in ASME B16.1 (cast iron) and B16.5 (steel). The flanged connection shall meet the bending moment requirements in Clause 7.21.</p>
5.4.7	-	<p>Added New Section</p> <p>Valves for flammable, hazardous fluids and safety valves</p>
5.4.7.1		<p>All parts in a valve coming in contact with the fluid used in the application shall have resistive properties to the fluid. The evidence shall show that materials have been evaluated as appropriate, for resistance to moisture, corrosion, and the effects of the fluid or gas.</p>
5.4.7.2		<p>Valve bodies and casings shall be of material having a melting point of not less than 427 °C.</p>
5.4.7.3		<p>For elastomer type material, coming in contact with fluids, the following shall apply:</p> <p>a) The valve shall be filled with the appropriate test liquid. After 70 h the liquid shall be drained and the valve assembly dried for 70 h at 25 °C.</p> <p>b) The valve shall function normally and comply with seat leakage test in Clause 7.9.4, external leakage test in Clause 7.9.5, and strength test of the fluid containing parts in Clause 7.10.</p>
5.4.8		<p>Added New Clause</p> <p>Hydraulic control valves intended for installation in elevator systems shall be made of material having factor of safety complying with ASME A17.1/CSA B44, <i>Safety Code for Elevators and Escalators</i>.</p>
5.5.1.2		<p>Electrically operated safety valves for liquids shall not leak past the seat at a rate greater than the flow rating of the valve multiplied by a factor of 10⁻⁶ when tested in accordance with Clause 7.9.2, <u>7.9.3</u>.</p>

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5.5.1.3		Electrically operated safety valves for gases shall not leak past the seat in excess of that specified in Table 3 when tested in accordance with Clause 7.9.3 <u>7.9.4</u> .
5.5.2.2		Electrically operated valves shall not leak externally at a rate in excess of 200 cm ³ /h when air or nitrogen is being used as the test fluid or 5 cm ³ /h when liquid is being used as a test fluid when tested in accordance with Clause 7.9.4 <u>7.9.5</u> .
5.7.2.5		The use of a green colour to identify a lead provided for connections to the supply shall be reserved for a lead provided for earthing <u>bonding</u> the valve.
5.12.2		Motors rated 1/3 hp or less that form part of motorized valves or valve operators shall comply with CSA C22.2 No. 77. <u>Motors shall be provided with thermal protection, impedance protection, or other forms of protection to comply with the locked rotor requirements of CSA C22.2 No. 77.</u>
5.14.1		Switches and controls shall comply with the requirements of the following: CAN/CSA-C22.2 No. 14, CSA C22.2 No. 24, <u>or CAN/CSA-E60730-2-9</u> , CSA C22.2 No. 55, and CSA C22.2 No. 111, so far as they apply. Thermal cut-off shall comply with CSA C22.2 No. 209 or CAN/CSA-60691.
5.15.2		Plug fuses shall not be used in circuits exceeding 150 V to earth <u>ground</u> .
5.16.2.1		Except as stated in Clause <u>5.16.2.2</u> and <u>5.16.2.3</u> , the spacings of low-voltage parts in a valve shall be not less than those specified in Table 6. <u>Unless otherwise stated pollution degree 3 (as defined in CAN/CSA E60730-1, Annex N) shall be used for evaluating equipment to this Standard.</u> Note: <i>Greater spacings might be required if the enclosure, because of its size, shape, or the material used, is not considered to be sufficiently rigid to warrant the minimum spacings.</i>
5.16.5	-	Added New Section Spacings on printed circuit boards
5.16.5.1		<u>The spacings between circuit paths on printed circuit boards shall be not less than 1.6 mm for 31–300 V rms and 0.8 mm for extra-low voltage safety circuits if a short circuit between the paths may result in unsafe operation of the control.</u>
5.16.5.2		<u>The spacings specified in Clause <u>5.16.5.1</u> may be reduced by 50% provided the following conditions are met:</u> <u>a) the board is coated with a suitable material and meets the requirements of Clause <u>7.20</u>; and</u> <u>b) prior to wave soldering, the board (except at solder pads) is coated with a suitable solder resistant material.</u>
5.20		Surge suppression components Such components shall not be connected between mains and accessible conductive parts except for grounded parts of permanently connected equipment. Such components, for example gas discharge tubes, shall meet the requirements of GSA C22.2 No. 4 <u>CSA LTR Number I-002-2011</u> for the specific end-application use.
5.21		Added New Section Components for communication applications <u>Components and accessories used in communication applications for remote valve control shall meet the requirements of the following standards:</u> <u>a) CAN/CSA-C22.2 No. 182.4, <i>Plugs, receptacles, and connectors for communication systems</i>;</u> <u>b) CAN/CSA-C22.2 No. 226, <i>Protectors in telecommunication networks</i>; and</u> <u>c) CSA C22.2 No. 233, <i>Cords and cord sets for communication</i>.</u>
5.22		Added New Section Thermal cut-off <u>Thermal cut-off shall meet the requirements of CSA C22.2 No. 209 or CAN/CSA-60691.</u>

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6	-	Marking
6.1.1		<p>Valves shall be plainly marked in a permanent manner with the following information:</p> <ul style="list-style-type: none"> a) manufacturer's name, trademark, tradename, or other recognized symbol of identification; b) catalogue or type designation that will specifically identify a valve; c) suitable words, numerals (such as the catalogue number), or symbols to identify a safety valve if the use of such a valve is regulated by an agency operated under statutory authority; <p>Note: <i>The intent of Item c) is accomplished by the marking of the number of the Standard to which the valve conforms, provided that the Standard applies only to safety valves.</i></p> <ul style="list-style-type: none"> d) the maximum operating pressure differential rating or the maximum rated pressure, whichever is less, for the typical fluids, air, water, and light oil, unless the valve is intended for a specific fluid or group of fluids, in which case the specific fluid or group of fluids is to be marked; e) *the intended direction of flow through the valve; f) holding amperes, volt amperes, or watts, except that ratings in watts are permitted only if the holding current does not exceed 1 A; g) the rated voltage; h) whether for use with dc or ac; <p>Note: <i>Frequency marking indicates ac operation.</i></p> <ul style="list-style-type: none"> i) number of phases, except for values obviously intended for single phase use only; j) time rating, if not continuous; k) for equipment that is provided with contacts for the control of external loads, the rating of the contacts; l) *maximum and minimum ambient temperatures, where applicable; m) *maximum fluid temperature, where applicable; n) maximum rated torque for valve actuators; and o) the identifier "ASME A17.1/CSA B44" for hydraulic control valves intended for installation in elevating systems in accordance with ASME A17.1/CSA B44, the <u>Safety Code for Elevators and Escalators</u>. <p>Notes:</p> <ul style="list-style-type: none"> 1) <i>Items marked with an asterisk "*" may be marked on the smallest shipping carton or included in installation instructions provided with each valve.</i> 2) <i>For valve actuators Items d), e), and m) do not apply.</i>
6.1.2		<p>Markings shall be permanent and shall comply with the requirements of CAN/CSA-C22.2 No. 0. Labels shall comply with the requirements of CSA C22.2 No. 0.15.</p>
7.4.3.1		<p>Added New Clause</p> <p>Valves shall be subject to Clauses 7.4.3.2 and 7.4.3.3.</p> <p>Valve actuators shall be subject to Clauses 7.4.3.3 and 7.4.3.4.</p>
7.4.9		<p>The temperature rise of a motor, when stalled, shall not exceed the values specified in Table 8, if stalling is part of the normal operation. <u>If stalling is not part of the normal operation, the motor shall comply with the abnormal test in Clause 7.19.</u></p>
7.5.1		<p>General</p> <p>Valves are considered to be properly opened or closed if the action causes the fluid flow to start and stop, respectively <u>and valve actuators to operate as declared in the intended manner.</u></p>

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7.5.2.1		Added New Clause The conditions for safety valves are specified in Clause 7.5.2.2 . The conditions for safety valve actuators are specified in Clause 7.5.2.3 .
7.5.2.3		Added New Clause Safety valve actuators The ability of safety valve actuators to open and close properly shall be tested under the following conditions: a) with supply voltage at the minimum shown for extreme operating conditions in Table 2 of CSA CAN3-C235 for the marked nominal voltage listed or at 85% of some other marked nominal voltage; b) with the maximum operating torque; and c) with the most severe conditions of ambient temperature.
7.5.3.1		Added New Clause The conditions for valves are specified in Clause 7.5.3.2 . The conditions for valve actuators are specified in Clause 7.5.3.3 .
7.5.3.3		Added New Clause General-purpose valve actuators Valve actuators shall be tested for proper opening and closing under the following conditions: a) at minimum voltage as specified in 7.5.2.2a); b) at the maximum torque; and c) at the lowest ambient temperature for which the actuator is intended.
7.5.4.1		Added New Clause Clauses 7.5.4.2 and 7.5.4.3 apply to valve assemblies. Clauses 7.5.4.4 and 7.5.4.5 apply to valve actuators.
7.5.4.4		Added New Clause Except as specified in Clause 7.5.4.5 , the travel time and response time shall be measured with the maximum mechanical load and at ambient temperatures, as declared by the manufacturer. The test shall be conducted with the actuator mounted in the most unfavourable position.
7.5.4.5		Added New Clause Where a maximum operating time is specified for a safety valve actuator, the time to open or to close shall be determined for the most unfavourable combination of conditions for which it is intended, such as: a) minimum voltage as specified in Clause 7.5.2.2a); b) maximum operating torque; and c) ambient temperature.
7.8.1.1.1		Added New Clause Clause 7.8.1.1.2 applies to valve assemblies. Clause 7.8.1.1.3 applies to valve actuators.
7.8.1.1.3		Added New Clause Valve actuators shall be operated for the number of cycles of the intended service in Table 5, with mechanical load, timing for each cycle of operation, as declared by manufacturer and conform to Clauses 7.8.1.2 and 7.8.1.8 to 7.8.1.10 .
7.8.1.2.1		Added New Clause Clause 7.8.1.2.2 applies to valve assemblies. Clause 7.8.1.2.3 applies to valve actuators.
7.8.1.2.3		Added New Clause For valve actuators, the speed of cycling shall be such that each operation shall complete full travel as declared by the manufacturer.

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7.8.1.8		<p>The endurance test for valves with declared minimum ambient temperatures shall follow one of the following depending on the valve type:</p> <p>a) For gas valves with manufacturer's specified minimum ambient temperature below 0 °C, the endurance test for 100 000 cycles is conducted as follows;</p> <p>i) The first 90 000 cycles of the test shall be conducted at the declared maximum fluid and ambient temperature.</p> <p>ii) The remaining 10 000 cycles shall be conducted at the declared minimum ambient temperature. If the fluid temperature is declared less than 25 °C, the test for the minimum ambient temperature shall be conducted at this minimum fluid temperature.</p> <p>(b) For the endurance test for 6 000 cycles</p> <p>(i) the first 5 000 cycles shall be conducted at the declared maximum fluid and ambient temperatures; and</p> <p>(ii) the remaining 1 000 cycles shall be conducted at the declared minimum ambient temperature.</p> <p><u>b) For non-metallic pneumatic valves with manufacturer's specified minimum low ambient temperature less than 10 °C, the test shall be conducted on one valve at the maximum declared ambient temperature and an additional valve at the declared lowest ambient temperature. The number of cycles at each temperature is as specified in Table 5.</u></p> <p><u>c) For valves other than Items a), and b) with manufacturer's specified minimum ambient temperature below 0 °C, half the number of cycles declared in Table 5 shall be conducted at the maximum ambient temperature, and the remaining cycles shall be conducted at the minimum ambient temperature. If the fluid temperature is declared less than 25 °C, the test for the minimum ambient temperature shall be conducted at the declared minimum fluid temperature.</u></p>
7.8.1.10		<p>In testing a modulating valve, all of the cycles shall include the closed position and shall be tested in accordance with the requirements of Table 5 <u>and these steps:</u></p> <p><u>a) Modulating valves shall perform the required repositions in addition to the number of cycles required for the endurance test.</u></p> <p><u>b) For each half cycle conducted, an odd number of repositions shall be performed such that the travel to the maximum end stop position is achieved. Refer to Figure 3 for an example in conducting the test.</u></p> <p><u>c) If the valve is intentionally designed to operate at a slower rate, the endurance test shall be continued until such time as the required minimum number of repositions and cycles are completed.</u></p>
7.8.1.11.1		<p>Added New Clause</p> <p>Clause 7.8.1.11.2 applies to valve assemblies. Clause 7.8.1.11.3 applies to valve actuators.</p>
7.8.1.11.3		<p>Added New Clause</p> <p>A general-purpose valve actuator for flammable and hazardous fluids shall complete an endurance test for 100 000 cycles. The test shall be conducted at the</p> <p>a) rated ambient temperature; and</p> <p>b) maximum rated torque.</p>
7.8.1.12.1		<p>Added New Clause</p> <p>Clause 7.8.1.12.2 applies to valve assemblies. Clause 7.8.1.12.3 applies to valve actuators.</p>

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7.8.1.12.3		Added New Clause Valve actuators shall be considered to comply with the endurance requirements of this Standard if, following the test specified in Clause 7.8.1.1.3, they operate as intended and per the declared torque. At the conclusion of the endurance test, valve actuators shall comply with the dielectric strength test of Clause 7.6.
7.8.1.13		Added New Clause Hydraulic control valves intended for elevating devices shall be tested at the rated pressure and within the fluid specifications and temperature range declared by the manufacturer. Each operating cycle shall be not less than 5 seconds and not more than 24 seconds.
7.9.1		Added New Clause The leakage tests of Clause 7.9 apply to valve assemblies and do not apply to valve actuators
7.9.5.4		Valves shall be considered to comply with the external leakage requirements if a) the measured rate of leakage does not exceed that allowed by Clause 5.5.2; <u>and or</u> b) for valves having a maximum rated pressure of 50 lb/in ² or more, when the fluid-containing parts of the valve are submerged in a suitable liquid to a depth of approximately 25.4 mm (1 in), while under the test pressure, no bubble indicating leakage is observed within 10 s after the parts are submerged.
7.9.5.5		Added New Clause For hydraulic control valves used in elevating devices the hydraulic pressure shall be maintained at twice the component rated pressure for a period of 10 min to establish the rate of leakage. The rate of leakage shall not exceed 10% of the rate flow of the valve.
7.10.1		Added New Clause The strength tests of fluid-containing parts of Clause 7.10 apply to valve assemblies and do not apply to valve actuators
7.10.6		Added New Clause For hydraulic control valves in elevating devices, with elongations greater than or equal to 10%, the pressure chambers of the valve shall be subjected to a hydraulic pressure of five times the component rated pressure. For hydraulic control valves in elevating devices, with elongations of less than 10%, the test value shall be 1.5 times the value specified in ASME A17.1/CSA B44, (<i>Safety Code for Elevators and Escalators</i>) multiplied by the component rated pressure.
7.10.7		Added New Clause For hydraulic control valves in elevating devices, the hydraulic pressure shall be maintained for a period of 5 minutes. During the test, the valve body shall not rupture. Notes: 1) <i>In order to obtain and maintain the test pressure, it is permissible to substitute alternate sealing material and to tighten bolts during the test.</i> 2) <i>It is not expected that the valve will be able to perform its function during or after the valve body strength test.</i>
7.12.5		Added New Clause The enclosure meeting the requirements of the CAN/CSA-C22.2 No. 0.17 flame test 5VA shall be considered acceptable in lieu of the flame test in Clauses 7.12.1 to 7.12.4.

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7.12.6		<p>Added New Clause</p> <p>The specimen shall be considered acceptable if, as a result of the test, the following conditions are met:</p> <ul style="list-style-type: none"> a) The enclosure material shall not continue to burn for more than 1 minute after the fifth application of the test flame. b) The specimen is intact to the extent that no openings are produced that would cause the equipment to fail the requirements of Clause 5.2.7. c) The specimen shall not drip.
7.14.1		<p>Fatigue Test: Test method</p> <p>Fatigue test pressure is applicable only to valves constructed of material used for fluid-containing parts confirmed in Clause 5.4.1.1. Cyclic test pressure (<i>PCT</i>) shall be calculated in accordance with Clause 5.4.1.2. See Tables 11 and 12, and Figure 2 for details. A suitable test fixture shall be designed to generate the test cycle. The fatigue test shall be conducted as follows:</p> <ul style="list-style-type: none"> a) A minimum of three to a maximum of five samples shall be tested. b) Each valve shall be subject to <ul style="list-style-type: none"> i) a minimum of one million cycles for general-purpose valves; or ii) a minimum of ten million cycles for each valve that is incorporated in continuously operating critical end applications. c) For the applicable test pressure, the cyclic test pressure shall be maintained for a time period, <i>T1</i>, of at least 100 mSecs or less with $PU > 0.95 PCT$. d) The cyclic test frequency shall be selected as $1/Ts$. e) Test pressure waveform shall be maintained at a pressure equal to or greater than the upper cyclic test pressure (<i>PU</i>)* for a time period of <i>T1</i>, minimum 0.3<i>TS</i> of one test cycle period. <p><i>* Where PU is the minimum value of the highest level of the specified test pressure cycle.</i></p> <p>Note: A typical test waveform is given in Figure 2 for illustration purposes.</p> <ul style="list-style-type: none"> f) The pressure shall rise to the required upper cyclic test pressure within time period of $0.4 \leq (Tr + T1) \leq 0.6T$ of one test cycle period. The lower cyclic test pressure (<i>PL</i>)* shall be less than 0.05 of upper cyclic pressure. The lower cyclic test pressure shall be maintained for a time period of <i>T2</i>, where $T2$ is $0.9T1 \leq T2 \leq 1.1T1$. <p><i>* Where PL is the maximum value of the lowest level of the specified test pressure cycle.</i></p> <ul style="list-style-type: none"> g) Any overshoot should not exceed the peak value (<i>PP</i>). Where <i>PP</i> does not exceed $1.05 PU$.
7.15		<p>Test for valves with valve bodies of thermoplastic material intended to be connected to the water supply main downstream of the delivery point.</p>

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7.15.1		Valves of fluid-containing parts of thermoplastic material, intended to be connected to the water supply main <u>downstream of the delivery point</u> , shall be subjected to the following test, which is conducted in an air-circulating heating cabinet. The maximum ambient test temperature shall be selected based on the declared maximum temperature rating of fluid <u>and the thermoplastic material type</u> . a) The temperature shall be maintained at the maximum ambient test temperature specified in Table 10. b) The test shall be made on three valves that have not been subjected to any tests. c) The samples shall be connected to a water supply system as in normal use and shall be filled with water, and shall be kept under these conditions for a period of 3 h. d) After this period, the water pressure shall be raised, within 5 <u>60</u> s, to a pressure of 862 kPa (125 psi) minimum for valves rated up to a maximum of 862 kPa (125 psi) or 115% of the rated maximum pressure for valves that are rated higher than 862 kPa (125 psi). e) The samples shall be kept under these conditions for the test period specified in Table 10.
7.16.1		Non-metallic material used in fluid-containing parts of a valve shall be checked by the <u>additional tests in Clauses 7.16.2 and 7.16.3</u> .
7.16.3		Each separate valve shall be subjected to the endurance test as confirmed in Clause 7.8 and number of operation is specified in Table 5, for each rated maximum ambient and fluid temperature. If the low ambient temperature is less than 10 °C, the test shall be conducted on a separate valve at the declared lowest ambient temperature. <u>A separate valve shall be subjected to the impact test of Clause 7.11. After the test the valve shall operate as intended.</u>
7.17.2		The assembly provided with the enclosure shall be covered with cheesecloth. The cheesecloth shall be the required number of single plies of bleached cheesecloth running approximately 34 g/m2 with a thread count in the range of 10–13 by 9–12 threads/cm. <u>All exposed metal parts shall be connected to ground through a 3 Amp fuse rated at maximum voltage.</u>
7.18.2		At the end of the test, all valve samples shall comply with the following: a) At the conclusion of the test there shall be no damage to the enclosure and no emission of flame or molten material. b) The test shall comply with the dielectric test of Clause 7.6. c) The integrity of the cheesecloth shall be intact. d) Valves employing a non-metallic valve body shall comply with the external leakage test specified in Clause 7.9.5. <u>e) The 3 Amp fuse shall be intact.</u>
7.19	-	Added New Section Abnormal
7.19.1		The test shall be carried out on electrically operated valve actuators with blocked output.
7.19.2		Valve actuators and similar motor-operated devices that, during their operating life, are not normally subjected to a stalled condition shall be subjected to the test requirements of Clause 7.19.3.

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7.19.3		The device shall be tested at the voltage specified in Clause 7.2, with the output blocked for 24 hrs. The temperature shall be recorded during the first hour, and at 24 hours. If the motor is thermally protected, the limits for the first test hour and after the first test hour are specified in Tables 2 and 3 of CSA C22.2 No. 77. The temperature of motors with impedance protection shall not exceed 150 °C if they are Class A insulated, or 175 °C if Class B, F, or H when tested for 72 hours under locked rotor conditions.
7.19.4		At the end of the test, the actuator shall comply with the following: a) There shall be no emission of any flame or molten material during the test. b) There shall be no damage to the control and it shall meet all the applicable requirements of this Standard. c) At the completion of the test, the device shall pass the dielectric strength test specified in Clause 7.6.
7.20	-	New Section Printed circuit board with conformal coating
7.20.1	-	Dielectric strength on printed circuit boards
7.20.1.1		One sample shall be flexed three times to simulate conditions that could be expected under normal use and manufacturing conditions.
7.20.1.2		After flexing, the sample shall be subjected to the following ac test voltages applied for one minute, without breakdown, between a) adjacent extra-low voltage safety circuits: 500 V; b) adjacent low voltage and extra-low voltage circuits: twice rated voltage + 1000 V; and c) adjacent low voltage circuits: twice rated voltage + 1000 V.
7.20.2	-	Dielectric strength after temperature conditioning
7.20.2.1		One sample shall be conditioned for 96 hours at 90 °C.
7.20.2.2		The tests of Clause 7.20.1 shall be repeated.
7.20.3	-	Dielectric strength after humidity conditioning
7.20.3		The remaining sample shall be conditioned for 96 hours at 32 ± 2 °C and 85 ± 5% relative humidity. The test shall be conducted in such a manner that no condensate appears on the test sample.
7.20.3		The tests of Clause 7.20.1 shall be repeated.
7.20.4		Following each of the above tests, the sample shall be investigated for adhesion of the coating to the board by scraping or cutting. The coating shall not flake.
7.21	-	Added New Section Torsion and bending moment
7.21.1		to withstand the stresses encountered in the end application use including during installation and maintenance.
7.21.2		The test shall be carried out as defined in ISO 23550, Clause 7.3.4. The torsion and the bending moment shall be conducted, based on the declared specifications, on a separate valve.
7.21.3		After conducting the tests in Clause 7.21.2, the valve is adjusted to the open position. The valve shall be subjected to strength test of fluid containing parts specified in Clause 7.10 at five times the maximum rated pressure.
7.21.4		At the conclusion of the tests the valve shall comply with external leakage test specified in Clause 7.9.5.
Table 5		Added Cycle requirements for General-purpose for hazardous fluids and Modulating Safety* Valves and actuators.
Table 7		Added Actuators to testing schedule



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Clause	Verdict	Comment
Table 8		Added Enclosed motors with Class F, and Class H insulation to "Windings of integral hp motors" section of table
Figure 3		Added Figure 3 Modulating valve reposition/cycle example
		CUSTOMERS PLEASE NOTE: This Table and column "Verdict" can be used in determining how your current or future production is or will be in compliance with the new/revised requirements.