a) The material has no single dimension greater than 1.83 m (6 ft);

b) The sum of the surface areas exposed to the air stream on all such materials in the product is not more than 0.93 m^2 (10 ft^2); and

c) One of the following conditions exists:

1) The material has a flammability classification of 5VA in accordance with UL 94 and 5VA in accordance with CAN/CSA-C22.2 No. 0.17; or

2) Results that comply with the intent of the requirement are obtained when the material is subjected to an enclosure flammability 127-mm (5-inch) flame test as described in UL 746C and 5VA in CAN/CSA-C22.2 No. 0.17.

50.3 Evaporation pad

50.3.1 An evaporative pad for use in a duct-mounted product shall be Class 1 or 2, and shall not be treated with a chemical that is water soluble.

50.4 Supply cord

50.4.1 A product intended for mounting in or on an exhaust duct or plenum may be provided with a power-supply cord if:

a) The cord is

1) A 3-conductor, Type SJT or heavier duty type rated for at least 105°C (221°F);

2) Terminated in a properly rated grounding attachment plug; and

3) No longer than 1.83 mm (6 ft); and

b) Installation instructions, as described in Clause 78.8, are included with the product.

PERFORMANCE

51 General Test Parameters

51.1 General

51.1.1 Except as otherwise required, one representative sample of the equipment shall be subjected to the applicable tests of this Standard.

51.1.2 The order of the tests, as far as applicable, shall correspond to the Leakage-Current Test, Clause 52 to the Mold Stress-Relief Test, Clause 73, but not so as to require unnecessary samples.

51.2 Voltage

51.2.1 Except as otherwise specified, humidifiers shall be tested at a frequency of 60 Hz, and at the voltages, maintained at the unit supply connections, as specified in Table 15. Units rated at other than 60 Hz frequencies shall be tested at their rated voltages and frequencies.

51.3 Ambient temperatures

51.3.1 Except as otherwise provided in this Standard, equipment may be tested in any convenient ambient temperature between 20 and 40°C (68 and 104°F).

52 Leakage-Current Test

52.1 When tested in accordance with Clauses 52.2 – 52.7, the leakage current of a cord-connected product rated 240 V or less shall not be more than:

a) 0.5 mA for a portable product; and

b) 0.75 mA for all other products.

52.2 All exposed conductive surfaces shall be tested for the presence of leakage currents. The leakage currents from these surfaces shall be measured to the grounded supply conductor individually as well as collectively if simultaneously accessible, and from one surface to another if simultaneously accessible. Parts shall be considered to be exposed surfaces unless guarded by an enclosure considered acceptable to reduce the risk of electric shock as described in the Accessibility of Uninsulated Hazardous Voltage Live Parts and Film-Coated Wire, Clause 7. Surfaces shall be considered simultaneously accessible if they can be readily contacted. Leakage current is not required to be measured at terminals of an extra-low-voltage circuit.

52.3 If a conductive surface other than metal is used for the enclosure or part of the enclosure, the leakage current shall be measured using metal foil with an area of 100 x 200 mm (4 x 8 in) in contact with the surface. If the surface is less than 100 x 200 mm, the metal foil shall be the same size as the surface. The foil shall not remain in place long enough to affect the temperature of the products.

52.4 The measurement circuit for leakage current shall be as illustrated in Figure 11. The measurement instrument is defined in (a) – (c) below. The meter that is actually used for a measurement need only indicate the same numerical value for a measurement as would the defined instrument. The meter used is not required to have all the attributes of the defined instrument.

a) The meter shall have an input impedance of 1500 ohms resistive shunted by a capacitance of 0.15 microfarad.

b) The meter shall indicate 1.11 times the average of the full-wave rectified composite waveform of the voltage across or current through the resistor.

c) Over a frequency range of 0 – 100 kHz, the measurement circuitry shall have a frequency response-ratio of indicated to actual value of current – equal to the ratio of the impedance of a 1500 ohm resistor shunted by a 0.15 microfarad capacitor to 1500 ohms. At an indication of 0.5 or 0.75 mA, the measurement shall have an error of not more than 5 percent at 60 Hz.

52.5 Unless the meter is being used to measure leakage from one part of a product to another, the meter shall be connected between the accessible parts and the grounded supply connector.

52.6 A sample of the product shall be tested for leakage current starting with the as-received condition, as-received being without prior energization except as might occur as part of the production-line testing, and with its grounding conductor open at the attachment plug. The supply voltage shall be adjusted to the voltage specified in Figure 11. The test sequence with reference to the measuring circuit – Figure 11 – shall be as follows:

a) With switch S1 open, the product shall be connected to the measuring circuit. Leakage current shall be measured using both positions of switch S2, and with the product switching devices in all of their intended operating positions.

b) Switch S1 shall then be closed, energizing the product, and within 5 seconds the leakage current shall be measured using both positions of switch S2 and with the product switching devices in all of their intended operating positions.

c) The leakage current shall then be monitored until thermal stabilization. Both positions of switch S2 shall be used in determining this measurement. Thermal stabilization shall be obtained by operation as in the Normal-Temperature Test, Clause 57.

d) After thermal stabilization, switch S1 shall be opened to de-energize the product. Monitoring of leakage current shall continue until the leakage current stabilizes or decreases after de-energizing the product, using both positions of switch S2.

52.7 Products with speed, temperature, or humidity controls shall be tested at low, medium, and high settings of the controls.

53 Humidity-Conditioning Test

53.1 A product shall be conditioned for 48 hours in air having a relative humidity of 88 ± 2 percent at a temperature of 32 ±2°C (90 ±4°F). After conditioning:

a) A cord-connected product rated for a nominal 240 V supply or less shall comply with the requirements in Clause 52.1 in a repeated leakage current test; and

b) A product other than as mentioned in (a) shall have an insulation resistance of 50,000 ohms or more between live parts and interconnected non-current-carrying metal parts.

53.2 A sample of the product shall be heated to a temperature just above 34° C (93° F) to reduce the likelihood of condensation of moisture during conditioning. The heated sample shall be placed in the humidity chamber and conditioned as specified in Clause 53.1.

53.3 Following conditioning:

a) A cord-connected product rated for a nominal 240 V supply or less shall be tested as described in Clause 52.6. The test shall be discontinued when the leakage current stabilizes or decreases; and

b) The insulation resistance of a product other than as described in (a) shall be measured as described in Clause 53.4.

53.4 Ordinarily, insulation resistance shall be determined by using a high-resistance voltmeter and a 250 V, direct-current circuit.

54 Operation Test

54.1 A product shall be operated for 24 hours in cycles of 15 minutes on and 45 minutes off, with water circulating through it in the intended manner. Immediately upon conclusion of the final on cycle of the 24-hour period, the leakage current or insulation resistance shall be measured as described in Clause 53.2. The leakage current or insulation resistance, as applicable, shall comply with the requirement in (a) or (b) of Clause 53.1. This requirement does not apply to a steam-type product.

54.2 A steam-type product shall be tested as described in Clause 54.3. The leakage current shall not exceed 0.5 mA, and there shall be no evidence of deterioration of the physical properties of the enclosure.

54.3 One sample of a steam-type product shall be supplied with water and operated continuously for 30 days at rated voltage and rated frequency. At the end of the 30 days, the sample shall be subjected to the Leakage-Current Test, Clause 52.

55 Starting Test

55.1 A product shall start and operate as intended on a circuit protected by a fuse as specified in Clause 55.2. During this test, the fuse shall not open. Also, any overload protector provided as part of the product shall not trip.

55.2 The fuses required by Clause 55.1 shall:

a) For cord-connected equipment, be the same rating as the attachment plug of the supply cord. The fuses shall be the time delay type, if equipment marking so specifies; and

b) For equipment intended for permanent connection to the supply, be either of the same rating as marked on the equipment or, if not marked, be of the same rating as the maximum permitted for motor-branch circuits in the National Electrical Code, ANSI/NFPA 70, and the Canadian Electrical Code, Part I, C22.1. The fuses shall be the time delay type, if equipment marking so specifies.

55.3 To determine compliance with Clause 55.1, the equipment, when connected to a supply circuit at the required test voltages and rated frequency, shall be capable of starting, from standstill to normal operating speed(s), three consecutive times without blowing the fuse, with the equipment initially at room temperature.

55.4 The equipment shall start and run under all normal speed control settings.

56 Input Test

56.1 When tested as described in Clauses 56.2 and 56.3, the input in amperes or watts or kilowatts to a product shall not be more than 110 percent of the rated value of the product, except that for single-phase motors with marked rating of 3 A or less, the input may be not more than 120 percent of the rated value.

56.2 The input measurement shall be made with the equipment dry, and also with water present so that the product is functioning in the intended manner.

56.3 If the humidifier includes heater(s), the input shall also be measured with the heater(s) in operation.

57 Normal-Temperature Test

57.1 All products

57.1.1 When a product is tested as described in Clauses 57.1.2 – 57.2.4, the temperature at any point shall not be high enough to:

a) Cause a risk of fire;

b) Damage any material used; or

c) Exceed the maximum acceptable temperatures specified in Table 16.

57.1.2 Temperatures shall be measured by means of thermocouples consisting of wires not larger than 24 AWG (0.21 mm^2). When thermocouples are used in determining temperatures of an electrical product, it is common practice to employ thermocouples consisting of 30 AWG (0.05 mm^2) iron and constantan wires and a potentiometer-type indicating instrument, and such equipment shall be used whenever referee temperature measurements by thermocouple are necessary.

57.1.3 A thermocouple junction and adjacent lead wire shall be securely held in thermal contact with the surface of the material to be measured, such as by securely taping or cementing the thermocouple in place. If a metal surface is involved, brazing or soldering the thermocouple to the metal might be necessary. For a thermocouple-measured temperature of a coil of an alternating-current motor having a frame diameter of 178 mm (7 in) or less, the thermocouple shall be mounted on the integrally applied insulation on the conductor.

57.1.4 A temperature shall be considered to be constant when three successive readings taken at 10 minute intervals indicate that stabilized temperatures have been established (no more than 1 percent net increase between the last two readings). If the temperatures measured are within 5 percent of the values specified in Table 16, the test shall be continued until two successive 10-minute readings indicate constant temperatures.

57.1.5 Ordinarily, coil or winding temperatures shall be measured by thermocouples. However, if the coil is inaccessible for mounting thermocouples, such as one immersed in sealing compound, or if the coil wrap includes thermal insulation or more than two layers of cotton not more than 0.8 mm (1/32 in) thick, the resistance method shall be used.

57.1.6 When the change-of-resistance method is used, determination of the temperature rise of a winding shall be calculated by the following formula:

$$\Delta t = \frac{R}{r}(k + t_1) - (k + t_2)$$

in which:

Δt is the temperature rise of the winding in °C;
R is the resistance of the coil at the end of the test in ohms;

r is the resistance of the coil at the beginning of the test in ohms;

k is 234.5 for copper and 225.0 for electrical conductor grade (EC) aluminum. Values of the constant (k) for other conductors shall be determined;

t_1 is the ambient temperature at the beginning of the test in °C; and

t_2 is the ambient temperature at the end of the test in °C.

57.1.7 When required, the value of R at shutdown shall be determined by taking several resistance measurements at short intervals, beginning as quickly as possible after shutdown. A curve of the resistance values and the time shall be plotted and extrapolated to give the value of R at shutdown.

57.1.8 All values for temperature rises in Table 16 are based on an assumed ambient temperature of 25°C (77°F). However, tests that are conducted at any ambient temperature within a range of 10 – 40°C (50 – 104°F) shall comply with the intent of this requirement.

57.1.9 A short length of rubber- or thermoplastic-insulated flexible cord exposed to a temperature of more than 60° C (140° F), such as at terminals, shall be acceptable if supplementary heat-resistant insulation of acceptable dielectric strength and temperature rating is employed on the individual conductors of the cord to reduce the likelihood of deterioration of the conductor insulation.

57.1.10 If a test is conducted at an ambient temperature other than 25° C (77° F), an observed temperature other than as mentioned in Clause 57.1.11 shall be corrected as described in Clause 57.1.12. Neither a corrected temperature, as specified in Clause 57.1.12, nor an observed temperature as specified in Clause 57.1.11, shall exceed the values specified in Table 16.

57.1.11 An observed temperature limited by an automatic temperature control or by a process such as the boiling of water or the introduction of a liquid at a fixed temperature shall not be corrected.

57.1.12 An observed temperature shall be corrected by addition [if the ambient temperature is lower than 25°C (77°F)] or subtraction (if the ambient temperature is higher than 25°C) of the difference between 25° C and the ambient temperature.

57.1.13 If a corrected temperature exceeds the value specified in Table 16, at the request of the manufacturer the test may be repeated at an ambient temperature closer to 25°C (77°F).

57.1.14 The product shall be operated under each condition of normal service. For a multispeed product, this includes operation at each speed, and for a reversible product, it includes operation in both directions. If a reversible product continues to operate in the same direction, but at a slower speed when the reversing switch is thrown, the requirement applies at the lower speed as well as at the normal speed. Operation shall be continued until temperatures have become constant. Please see Clause 57.1.4.

57.1.15 The temperature test shall be conducted with the product dry as well as with water as intended. The requirement in Clause 57.1.1 shall apply for both conditions. A product that is permanently connected to a water supply is not required to be operated without water.

57.1.16 A product having a regulating means that operates in response to the relative humidity of the air so as to cause intermittent operation shall have the regulator bypassed or defeated during the normal temperature test.

57.1.17 A product that has an adjustable humidifying output shall be operated at the maximum output for the normal temperature test.

57.1.18 Controls that are actuated by either room temperature or humidity shall be shunted out of the circuit to obtain maximum normal condition.

57.1.19 A stationary or fixed product where one of the following applies, shall be tested in an alcove:

a) It is obvious the product is not intended for duct or plenum mounting; or

b) The product is marked in accordance with Clause 76.2, or lends itself to such installation.

57.1.20 The walls of the alcove shall consist of nominal 9.5 mm (3/8 in) plywood, the inside surfaces of which shall be painted dull black. The alcove shall consist of two sides, a back, and a top, and shall be of such dimensions as to extend 0.61 m (2 ft) beyond the back and one side of the product. The product shall be located as close to the sides of the alcove as its construction will permit, and it shall be located so that maximum heating of the walls will occur. A product marked in accordance with Clause 76.2 shall be spaced away from the sides of the alcove as specified in the marking.

57.1.21 For the temperature test, a separate controller – a controller that is not a physical part of the product – that is intended for installation in a wall shall be mounted as follows. The controller shall be secured inside its own enclosure, if provided; otherwise it shall be installed inside the smallest standard flush-type outlet box that will accommodate it, and the box shall be mounted in a simulated wall section as illustrated in Figure 12.

57.2 Duct- or plenum-mounted products

57.2.1 The temperature test of a product (whether intended for residential or commercial applications) that could be mounted in or on a furnace duct or plenum shall be conducted with the product mounted in or on a duct or plenum with the intended water supply connected. The temperature of the outlet air from the furnace during the test shall be maintained at 93°C (199°F) for a residential-type product, and at 121°C (250°F) for any other products. A product marked in accordance with Clause 78.5 shall not be tested in or on a duct or plenum.

57.2.2 A product intended for residential applications, and for duct or plenum mounting, shall be tested as described in Clause 57.2.3, and there shall be no emission of flame, smoke, or molten metal, nor shall the fuse in the grounding connection open.

57.2.3 The product shall be mounted in the intended manner and non-current-carrying metal parts shall be connected to ground through a 3 A fuse. The product shall be operated without water in the mode of operation most likely to result in the highest temperatures. This test shall be continued until ultimate results are obtained.

57.2.4 A grid consisting of nine thermocouples of identical length, wired in parallel, shall be installed in the furnace outlet duct to measure the temperature of the furnace outlet air. The arrangement shall be such that one thermocouple will be located centrally in each of nine equal rectangular duct areas in a plane perpendicular to the axis of the duct. The grid shall be located not more than 152 mm (6 in) downstream from the location nearest the furnace at which no thermocouple will be directly affected by radiation from a heating element, and the humidifier air-inlet shall be located 152 mm downstream from the grid.

58 Disassembly and Reassembly Test

58.1 If the instructions involve disassembly of any parts for cleaning, it shall be determined that the product is unlikely to be reassembled in a manner that will result in a risk of fire, electric shock, or injury to persons.

59 Impact

59.1 A part as described in Clause 9.1 shall be subjected to an impact of 2 J (1.5 ft-lbs) on any surface that is exposed to a blow during intended use, and:

a) The performance of the product shall not be adversely affected so that a risk of fire or electric shock is introduced; and

b) A moving part presenting a risk of injury to persons shall not be exposed to contact as determined by use of the probe illustrated in Figure 7 and Table 3.

A component such as a pilot lamp, a lens, a control knob, or the like is not required to be subjected to the impact test.

59.2 A smooth steel sphere, 51 mm (2 in) in diameter and weighing approximately 0.5 kg (1.18 lbs) shall be allowed to fall vertically from rest through a distance of 381 mm (15 in) to strike the part being tested.

For a part that cannot be struck from above by the freely falling sphere, the sphere shall be suspended by a cord and allowed to fall as a pendulum through a vertical distance of 381 mm. Only one impact shall be applied at a given point.

60 Rotating Members

60.1 A rotating part, the breakage or loosening of which may create a risk of injury to persons, shall be constructed of such material and in such a manner as to reduce the likelihood of its breakage or loosening.

60.2 A product having a series motor shall be tested as described in Clause 60.3, and no part that could cause an injury shall become loosened. A test is not required to be conducted if a review of the manufacturer's specifications indicates that the part or parts are adequately strong.

60.3 For the test discussed in Clause 60.2, a product having a series motor shall be operated for 1 minute at the no-load speed resulting from application of 130 percent of rated voltage.

61 Dielectric Voltage-Withstand Test

61.1 A product shall withstand, without breakdown, a 40 – 70 Hz potential applied for 1 minute between hazardous-voltage live parts and dead metal parts and between live parts of hazardous-voltage and extra-low voltage circuits. The test potential shall be 1000 V plus twice the rated voltage. The test potential for units rated at not more than 373 W output (1/2 HP) shall be 1000 V.

61.2 Equipment using an extra-low-voltage circuit shall withstand, without breakdown, a 40 – 70 Hz potential of 500 V applied for 1 minute between the extra-low-voltage circuit and dead metal parts. When components such as a temperature limiting device, motor overload protective device or other protective device where a short or grounded circuit may result in a risk of fire, electric shock, or injury to persons are used in the extra-low-voltage circuit, the dielectric voltage-withstand test shall also be conducted between live parts of opposite polarity.

61.3 With reference to Clause 61.2, the test between extra-low-voltage parts of opposite polarity shall be conducted on magnet coil windings after breaking the inner coil lead where it enters the layer. This opposite polarity test is not required to be conducted on the complete assembly as long as the components have been separately subjected to this test.

61.4 A 500 V-A or larger transformer, the output voltage of which is essentially sinusoidal and is capable of being varied, shall be used to determine compliance with the requirements in Clauses 61.1 – 61.3. The applied potential shall be increased gradually from zero until the required test value is reached and shall be held at that volume for 1 minute. The requirement of a 500 V-A or larger transformer is not required when the high potential testing equipment maintains the specified high potential voltage at the equipment during the duration of the test.

61.5 When the charging current through a capacitor or capacitor-type filter connected across-the-line, or from line-to-earth ground, is large enough to make it impossible to maintain the required alternating-current test potential, the capacitors and capacitor-type filters shall be tested as described in Clause 61.6.

61.6 The capacitors and capacitor-type filters specified in Clause 61.5 shall be subjected to a direct-current test potential of 1414 V for equipment rated 250 V or less or 1414 V plus 2.828 times the rated circuit voltage for equipment rated at more than 250 V. The direct-current test potential shall be maintained for 1 minute without breakdown.

61.7 Components providing a direct current path in parallel with the insulation to be tested, such as discharge resistors for filter capacitors and voltage limiting devices, may be disconnected during the test.

62 Strain-Relief Test

62.1 General

62.1.1 The strain-relief means provided on the flexible cord of a product shall be tested as described in Clause 62.1.2. During this test, there shall be no such movement of the cord as to indicate that stress would have been transmitted to the connections.

62.1.2 The connections of the cord within the product shall be disconnected. A 15.9 kg (35 lb) weight shall be suspended on the cord and supported by the product so that the strain-relief means will be stressed from any angle that the construction of the product permits. The stress shall be applied for 1 minute.

62.2 Through-cord switch

62.2.1 The connections between the terminals of a through-cord switch and the flexible cord shall withstand a 133 N (30 lbf) pull, applied for 1 minute between the cord and the switch, without detachment of a conductor from a terminal and without exposing the uninsulated conductor of the cord.

63 Power-Supply Cord Push-Back Relief Test

63.1 To determine compliance with Clause 22.5, a product shall be tested in accordance with Clause 63.2 without occurrence of any of the conditions specified in Clause 22.5 (a) – (c).

63.2 The power-supply cord shall be held 25 mm (1 inch) from the point where the cord emerges from the product. It shall then be pushed back with casual force until either:

a) The cord buckles; or

b) The force required to push the cord into the product exceeds 25 N (5.6 lbf).

64 Cable-Clamp Test

64.1 If a clamp is used with Type SPT-2 or SVT cords as mentioned in Clause 22.3, six samples of the clamp that have been secured to the cord in the intended manner shall be investigated to determine if they are acceptable for the application. Three samples shall be subjected to the dielectric voltage-withstand and strain-relief tests in the as-received condition. The other three samples shall be placed in an air oven for 168 hours. The oven temperature shall be 10° C (18° F) higher than the temperature rating of the insulation of the cord, but not less than 100° C (212° F). The samples shall comply with the dielectric voltage-withstand test requirements in Clause 61.1, the value of applied potential being based on the rating of the product. The potential shall be applied between the clamp and all conductors spliced together. After cooling to room temperature, the conditioned samples shall comply with the Strain-Relief Test, Clause 62.

65 Abnormal Operation Test

65.1 General

65.1.1 If the conditions of normal operation are not representative also of abnormal conditions likely to be encountered in actual service, the product shall not cause a risk of fire, electric shock, or injury to persons when operated under such abnormal conditions.

65.1.2 The conditions resulting from abnormal operation of a product shall be confined by the enclosure when the product is subjected to tests such as blocked armature in a relay, transformer burnout, stalled rotor, operation without liquids, or other conditions that could be encountered in service.

65.1.3 An electrode-type product shall be operated as described in Clause 65.1.4 until ultimate results are obtained. The results shall not be acceptable if a nonintegral branch-circuit protector trips during the test. After the test, the product shall comply with the Starting Test, Clause 55 and the Input Test, Clause 56. A product is not required to be subjected to this test if the water-level-limiting device operates for 100,000 cycles with no mechanical or electrical malfunction or significant pitting or burning of the contacts.

65.1.4 The product shall be mounted as intended and connected to a source of rated voltage. The drain valve shall be blocked closed, the water-inlet valve blocked open, each water-level-limiting device shall be bypassed, and the electrodes shall be electrically connected. In addition, the product shall be mechanically and electrically isolated from any ground means. If the hardness of the water could be a factor, the test shall be performed with a solution of 0.5 g (0.018 oz) of calcium sulfate ($CaSO_4$) per litre of distilled water. The product shall be operated until ultimate results are obtained.

65.1.5 A product that is permanently connected to a water supply shall be operated without water.

66 Thermal Cutoff Test

66.1 A thermal cutoff shall open the circuit in the intended manner without causing the short circuiting of live parts and without causing live parts to become grounded to the enclosure when the product is tested as described in Clause 66.2. Opening of the fuse in the grounding circuit is also not acceptable.

66.2 The enclosure of the product shall be connected through a 3 A fuse to ground and any other thermally-operated control devices in the product shall be short circuited. The supply voltage shall be as described in Clause 51.2. The product shall be operated with separate thermal cutoffs five times. Each thermal cutoff shall perform as intended.

67 Gasket Test

67.1 A material covered in Table 17 that is used for gaskets to:

a) Prevent water entry into an electrical compartment; or

b) Prevent hot water leakage external to the product

shall have physical properties as specified in Table 17 before and after accelerated aging under the conditions specified in Table 18. Gaskets shall not be required to have physical properties as specified in Table 17 when the gasket is normally wet during operation and complies with the test of Clause 68.

67.2 A gasket of material other than those covered in Table 17 shall be nonabsorptive and shall provide equivalent resistance to aging and temperature.

68 Liquid-Container Test

68.1 If the deterioration or breakage of a liquid container, seal, or similar component could increase the risk of electric shock, the component shall be resistant, as determined by investigation, to deterioration from the liquid intended to be used in contact with that component.

68.2 The test procedure for determining whether a component complies with the requirements in Clause 68.1 depends upon the material of which it is composed, its size, shape, mode of application in the product, and the like. The test procedure shall include visual inspection for determination of cracks,

deformation, and the like, after accelerated aging, and a comparison of hardness, tensile strength, and elongation before and after accelerated aging.

68.3 With reference to Clause 68.2, a component of rubber, neoprene, or thermoplastic shall be tested to compare its tensile strength and elongation before and after conditioning as described in Clauses 68.4 and 68.5. The tensile strength and elongation after the conditioning described in Clause 68.4 shall not be less than 50 percent of the tensile strength and elongation measured before the conditioning, and not less than 60 percent after the conditioning described in Clause 68.5.

68.4 A component as mentioned in Clause 68.3 shall be immersed for 7 days in the liquid used with the material at a temperature not less than 10°C (18°F) higher than the maximum wet operating temperature of the material measured under intended operating conditions, but not less than 70°C (158°F).

68.5 A component as mentioned in Clause 68.3 shall be conditioned in an air-circulating oven at the temperature and for the number of days specified in Table 19. The maximum wet operating temperature of the material measured under intended operating conditions shall be used. When dry operating time is greater than 5 percent of total operating time, the maximum dry operating temperature shall be used.

68.6 As an alternative to air oven tests as specified in Table 19, the acceptability of a liquid container, seal, or diaphragm may be determined by means of an aging test of the complete product under service conditions. The duration of the test shall be representative of the expected service life of the product.

69 Flooding of Live Parts Test

69.1 To determine whether malfunction or breakdown of a timer switch, float- or pressure-operated switch, or the like will result in a risk of electric shock, the product shall be conditioned as described in Clauses 69.2 and 69.3. The results are not acceptable if:

a) During and after the conditioning:

1) There is obvious wetting, as described in Clause 69.5, of any electrical component; and

2) For a portable or stationary product when evaluated as described in Clause 69.4, the leakage current exceeds 5.0 mA; and

b) After the conditioning, the product:

1) Does not comply with the requirements of the Dielectric Voltage-Withstand Test, Clause 61; and

2) For a permanently connected product, the insulation resistance between current-carrying parts and exposed non-current-carrying metal parts is less than 50,000 ohms.

69.2 The product shall be connected to a water supply. The timer switch shall be defeated and the product started. If no automatic shutoff means is provided, the fill shall be continued for an additional 15 minutes following the first evidence of overflow of the reservoir. If a float- or pressure-operated switch is provided as an automatic shutoff means, actuation of the fill switch to terminate the fill will also terminate the test. If both a timer and fill switch are provided, a second test shall be conducted as described above with the timer operating as intended and with the fill switch defeated. Both during the after conditioning, the product shall be tested for compliance with (a) of Clause 69.1, and after conditioning, it shall be tested for compliance with (b) of Clause 69.1.

69.3 A rubber barrier or rim seal of a reservoir shall not be removed when a test is being conducted to simulate malfunction or breakdown of a timer switch or of a float- or pressure-operated switch.