36 Broken Element Test

36.1 An open-wire heating element in an appliance shall be constructed and supported so that if the wire is cut at any point there shall be no reduction of electrical spacings below the limits specified in this standard. After being cut, no portion of the heating element wire shall be accessible to contact by the articulate probe through any opening in the enclosure.

36.2 To determine compliance with 36.1:

a) The appliance is first to have been operated until fully heated as in the Power Input or Temperature Tests; and

b) After cutting the heating element, the appliance is to be rotated 360° in the direction most likely to cause contact between the heating element and accessible metal parts.

37 Strain Relief Test

37.1 The strain-relief means provided on an attached flexible cord, when tested in accordance with 37.2, shall be capable of withstanding for 1 minute, without displacement, a pull of 35 lbf (156 N) applied to the cord, with the connections within the appliance disconnected.

37.2 The specified force is to be applied to the cord and so supported by the appliance that the strain-relief means is stressed from any angle that the construction of the appliance permits. The strain relief is not acceptable if, at the point of disconnection of the conductors, there is sufficient movement of the cord to indicate that stress on the connections has resulted.

38 Push-Back Relief Test

38.1 To determine compliance with 11.2.3, a product shall be tested in accordance with 38.2 without occurrence of any of the following conditions:

- a) Subjecting the supply cord or lead to mechanical damage;
- b) Exposing the supply cord or lead to a temperature higher than that for which it is rated;

c) Reducing spacings (such as to a metal strain-relief clamp) below the minimum required values; or

d) Damaging internal connections or components.

38.2 The supply cord or lead is to be held 1 inch (25.4 mm) from the point where the cord emerges from the product and is then to be pushed back into the product. The cord or lead is to be pushed back into the product in 1 inch (25.4 mm) increments until the cord buckles or the force to push the cord into the product exceeds 6 pounds-force (26.7 N). The supply cord or lead within the product is to be manipulated to determine compliance with 11.2.3.

39 Metal Enclosure Impact Tests

39.1 A metal enclosure part shall comply with the tests specified in 39.2 – 39.5. For polymeric enclosure parts, see the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

39.2 A metal enclosure part shall withstand the ball impact, with the appliance restrained, as described in 39.3 without occurrence of any one of the following conditions:

a) Making live parts accessible to contact with the articulate probe, see 7.11 and 7.12.

b) Producing any other condition that results in damage of the enclosure so as to adversely affect the function of any safety or constructional feature, such as thermostats, overload-protective devices or strain relief.

c) Producing other conditions so that the appliance does not comply with the dielectric voltagewithstand requirements in Dielectric Voltage-Withstand Test, Section 35, after being subjected to the impact.

39.3 Each of three samples of the appliance is to be subjected to one impact. This impact is to be imparted by dropping or swinging a 2-inch (50.8-mm) diameter steel sphere, weighing 1.18 lbf (0.535 kg) from a height that will produce an impact of 1.5 ft-lbf (2.03 J). The sample is to be rigidly supported and the impact is to be made perpendicular to the most vulnerable spots on the appliance enclosure that are exposed to a blow during intended use. A different spot on the enclosure is to be selected for each impact. See Figure 39.2 with respect to the ball drop impact test and Figure 39.3 for the ball pendulum impact test.

Exception: If the manufacturer elects, fewer than three samples may be used for the test in accordance with Figure 39.1, wherein each series consists of one impact. The overall performance is acceptable upon completion of any one of the procedures represented in Figure 39.1.



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39.4 With reference to Figures 39.2 and 39.3, the "H" designation represents the vertical distance the sphere must travel to produce the desired impact. For the pendulum impact, the sphere is to contact the test sample when the string is in the vertical position. The supporting surface is to be as described in 39.5. The backing surface for the pendulum impact is to consist of 3/4-inch (18 mm) plywood over a rigid surface of concrete or an equivalent nonresilient backing surface may be used.

39.5 The supporting surface mentioned in 39.4 is to consist of a layer of tongue-and-groove oak flooring mounted on two layers of 3/4-inch (18-mm) thick plywood. The oak flooring is to be 3/4- by 2-1/4-inch (18-by 57-mm). The assembly is to rest on a concrete floor or an equivalent nonresilient surface.

40 Thermal Degradation

40.1 A thermoset material used for a part of an appliance where risk of fire, electric shock, or injury to persons is involved shall be resistant to thermal degradation at the maximum temperature to which it is exposed during normal use of the appliance. The thermal-aging characteristics of the material may be investigated by any one of the following procedures:

a) The material shall have a temperature index, based on historical data or a long term thermal aging program, described in the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B, which indicates acceptability for use at the temperature involved; or

b) The product shall be operated with the input voltage adjusted so that the part in question operates at the maximum temperature obtained during the normal temperature test. The test is to be conducted with all temperature controls by-passed for a period of 1000 hours. There shall be no visible degradation of parts at the conclusion of the 1000 hours.

41 Handle Securement Tests

41.1 General

41.1.1 A handle assembly shall not deteriorate so as to increase the risk of potential injury as a result of being subjected to the test described in 41.2.1 - 41.6.3. Three samples are to be subjected to each test unless otherwise specified in accordance with Figure 41.4.

41.1.2 A handle shall not break, loosen, crack, or be rendered incapable of supporting the vessel, or expose live parts as a result of the tests in 41.7.1, and 41.7.2. Three previously untested samples shall be subjected to the test.

41.2 Oven conditioning

41.2.1 Prior to conducting any of the tests in this Section, three samples of a vessel and handle assembly incorporating thermoplastic parts shall be conditioned in a full-draft circulating-air oven maintained at the maximum handle temperature recorded during the normal temperature test or the maximum handle temperature reached on a nonheated vessel within 5 minutes after it is filled following the brew cycle. The samples are to remain in the oven for 168 hours. Following the conditioning and after the samples have cooled to room temperature, the samples are to be tested in accordance with 41.3.1 - 41.6.3.

41.2.2 If the temperature of the handle assembly exceeds the maximum assigned temperature rating of the material during the normal temperature test, the test in 41.2.3 is to be conducted in lieu of the test in 41.2.1.

41.2.3 Three vessels with handle assemblies are to be placed in a full-draft circulating-air oven for a period of 240 hours maintained at the maximum temperature recorded on the handle during the Normal Temperature Test or at the maximum temperature reached on a non-heated vessel within five minutes after it is filled following the brew cycle. During this time period, the vessels are to be removed from the oven and allowed to cool for five separate one-hour periods, at intervals not less than 24 hours. The 240-hour period is actual in-oven time and does not include the cool down periods. During each of the cool down periods, the vessels are to be supported by the handle assembly in the intended manner while loaded with No. 7 or No. 7-1/2 shot having a weight of the maximum intended capacity of water. Following the conditioning and after the vessels have cooled to room temperature, the vessels are to be tested in accordance with 41.3.1 - 41.6.3.

41.3 Dishwashing

41.3.1 Following the test of 41.2.1, an immersible vessel incorporating thermoplastic parts shall be conditioned as follows to simulate dishwasher cleaning. It shall be immersed in a commercially available dishwasher detergent solution using 25 g/L of water for 1 hour at 150°F. Following this, it is to be removed, kept at room temperature for 1 hour, oven aged at 160°F for 1 hour, and then cooled to room temperature for 1 hour.

41.4 Flexing test

41.4.1 The three samples of the vessel are to be supported in the intended manner by the handle assembly while loaded with a mixture of water and gelatin having a weight equivalent to its maximum intended capacity of water. The test load is to be distributed such that the normal center of gravity is not changed. The handle assemblies are then to be flexed for 12,000 cycles in the normal plane of pouring, forward 45 degrees from the vertical and backwards 45 degrees from the vertical. Each cycle consists of tipping the vessel forward 45 degrees, back to the vertical position, then back 45 degrees and then forward to the vertical position. Following the above, the test is to be repeated for an additional 12,000 cycles with the flexing being performed from side to side, that is, 45 degrees to the left and 45 degrees to the right of the normal vertical position. The cycle rate is to be 6 - 8 cycles per minute.

41.5 Static load

41.5.1 Each vessel is then to be supported for 1 minute in the intended manner by the handle assembly while loaded with a mixture of silica sand and water (80/20 percent by weight) having a weight equivalent to two times the weight of the maximum intended capacity of water. The lid is to be in place, but is not to be considered as part of the test weight. The test weight is to be distributed so that the normal center of gravity is not changed. The handle is to be gripped over a 2- to 4-inch (51- to 102-mm) wide gripping area (centered over the intended gripping area) for these tests.

41.6 Static force

41.6.1 A force equal to two times the force exerted by the maximum intended capacity of water is to be applied for 1 minute to the handle at an angle perpendicular to the side of the handle and parallel to the bottom of the vessel at a point as close to the point of securement as possible. The vessel is to be prevented from rotating while the force is applied. The force is to be applied with a 1/2 inch (12.7 mm) diameter rod terminating in a hemispherical end. See Figure 41.1.



41.6.2 The test indicated in 41.6.1 is to be repeated with the force being applied in the same manner except that the point of application shall be such that the greatest torque is at the point of securement, or at two securement points for a "D" handle, see Figure 41.2.



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41.6.3 A force equal to two times the force exerted by the maximum intended capacity of water is to be applied for 1 minute at the farthest extremity of the handle in a horizontal direction first pulling away from the vessel, and then repeated pushing toward the vessel. The vessel is held for each test. See Figure 41.3.

Exception: For a horizontal handle, the force is to be applied by first pulling up on the handle and then repeated, pushing down on the handle.



Figure 41.3

41.7 Dynamic load

41.7.1 Each vessel is to be loaded with water and a weight (such as ball shot) distributed evenly across the bottom of the vessel. The load shall be equivalent to two times the weight of the maximum intended capacity of water. The lid is to be in place, but is not to be included when calculating the test weight. The water level shall be between 0.25 inch (6.35 mm) and 1 inch (25.4 mm) from the vessel rim. If the water level is reduced due to splashing or evaporation, the vessel shall be refilled to the original level.

41.7.2 The water shall be heated and maintained at the maximum liquid temperature recorded during the normal temperature test, ±4°F (±2°C), or 194°F (90°C), whichever is lower. See 33.1.26. If an additional heater is used to heat the water, and is supported by the handle, the heater weight should be included as part of the test weight.

41.7.3 The weighted vessel is to be mounted to a test fixture such that the handle is held over a 2- to 4-inch (51- to 102-mm) wide gripping area and held such that the bottom of the vessel is horizontal. Due to limitations of handle design, a smaller width gripping area may be used. The test fixture shall provide a dynamic load upon the handle by lifting the vessel for a total of 10,000 cycles. Each cycle shall consist of lifting the vessel with weight, to a height of 0.50 inches (12.7 mm) in no more than 0.75 seconds of time, holding the vessel at this height for at least 3 seconds, and then returning to the original position.



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42 Under-Cabinet and Wall Mounted Appliances-Impact Test

42.1 The impact test of 42.2 shall be conducted on all under-cabinet and wall mounted appliances without occurrence of any of the following conditions:

a) Making live parts accessible to contact with the articulate probe, see 7.10 and 7.11.

b) Producing any other condition that results in damage of the enclosure so as to adversely affect the function of any safety or constructional feature, such as thermostats, overload-protective devices or strain relief.

c) Producing other conditions so that the appliance does not comply with the dielectric voltagewithstand requirements in Dielectric Voltage-Withstand Test, Section 35, after being subjected to the impact.

d) Dislodging of the appliance or separable parts of the appliance.

42.2 A 1.5 ft-lbf (2.03 J) impact is to be performed on all exposed sections of the enclosure, while the unit is installed under a cabinet or on a wall. Each of three samples is to be subjected to one impact on each surface. The impact is to be imparted by swinging a 2-inch (50.8 mm) diameter steel sphere, weighing 1.18 lb (0.535 kg) from a height that will produce an impact of 1.5 ft-lbf (2.03 J).

Exception: This test does not apply to glass surfaces..

43 Loading Test

43.1 A loading test is to be performed on the mounting brackets of an under-cabinet or wall mounted appliance with the appliance mounted in accordance with the manufacturer's installation instructions, using the hardware and construction as described. A bracket shall not break, loosen, or pull out of the wall nor shall any portion of the unit attached to the mounting means be adversely affected as a result of this test.

43.2 The test load is to consist of the weight of the appliance plus three times the maximum normal load (food load, water, grounds, basket, and the like, based on cavity size and maximum recipe book weight recommendations). A gradually increasing force is to be applied to act vertically through the center of the gravity of the unit. The force is to be increased in a 5 to 10 second interval until the test load is applied to the mounting system and is to be sustained for a period of 1 minute. For this test, an under-cabinet unit is to be mounted on a wood board with a minimum thickness as specified by the manufacturer and a wall unit is to be mounted on 3/8 inch (4.8 mm) thick wall board.

43.3 If the mounting brackets are constructed of a thermoplastic material, they are to be conditioned for 7 hours in an air circulating oven maintained at 70°C (158°F) or 10°C (18°F) higher than that measured during the normal temperature test, whichever is higher, prior to performing the loading test.