Items in Table 40.1	Additional Thermocouple Rise	
Item 6 and part a of item 7	15°C	(27°F)
part a of item 8	5°C	(9°F)
part a of item 10	20°C	(36°F)
part a of item 11	10°C	(18°F)

40.1.8 To determine whether a heater complies with the requirement in 40.1.1, it is to be operated continuously until constant temperatures have been reached. A temperature is considered to be constant when three successive readings, taken at intervals of 10 percent of the previously elapsed duration of the test (but not less than 5-minute intervals), indicate no change.

40.1.9 The test voltage is to be as indicated in Table 40.2, except that, if the application of the indicated test voltage does not result in the measured wattage input to the heater being equal to or more than the marked wattage rating, the test voltage is to be increased until the measured wattage input equals the marked wattage rating.

Table 40.2
Voltage for temperature test[a]

Marked voltage rating	Test potential in volts
Value within one of the specified ranges	Highest value of corresponding specified ranges
Value not within one of the specified ranges	Rated voltage
[a] Specified range refers to any of the ranges of voltage mentioned in 66.1.	

40.1.10 With reference to 40.1.9, a heater shall be operated at the maximum rated input. However, for a heater that employs adjustable controls for heater or fan settings, tests at lower heater and fan settings shall also be conducted if the lower settings may produce higher temperatures on heater parts or the test enclosure.

40.1.11 If a heater employs a motor in addition to a heating element, the voltage applied to an integrally connected motor is to be the marked voltage rating of the heater, in accordance with 66.1.

40.1.12 In conducting a test to determine whether or not a heater complies with the temperature requirements, it is to be hung or supported as in service and tested under conditions approximating those of normal operation, except as otherwise noted. Temperatures are to be taken on nearby surfaces, on the supporting surface, at points of support, on attachment plugs, and at other points as may be necessary.

40.1.13 A heater which uses a confined heat transfer fluid shall be fitted with a suitable pressure-measuring instrument, such as a pressure gauge, pressure transducer or similar device, so that the pressure within the heater may be measured during the testing of the heater.

40.1.14 The maximum pressure recorded during the testing of the heater (see 40.1.13) shall serve as a basis for determining the suitability of the strength of the vessel under pressure.

40.2 Temperature controls

40.2.1 The tests are to be performed with any combinations of temperature controls in the circuit and out of the circuit where such combinations may result in higher temperatures or increased risk of electric shock or fire.

Exception: The following controls are to be left in the circuit:

a) A designated temperature limiting control [see 3.19(b)]

b) An auxiliary temperature control evaluated as a temperature limiting control with the temperature limiting control out of the circuit.

40.2.2 The temperature limiting control of a heater shall not function when the heater is operated under the Normal Temperature Test, at room ambient temperature. A room ambient temperature of 25°C (77°F) is assumed, but the test may be conducted at a higher ambient temperature provided the temperature limiting control does not operate (open circuit).

40.2.3 With respect to 29.1, a tip-over switch that actuates the contacts of a temperature regulating control, shall be rendered inoperative during abnormal tests, including the Tip-Over Test, 42.4.1 – 42.4.4, and during the Element Support Impact Tests, Section 52, and Drop Test, Section 53.

40.3 Specified test conditions

40.3.1 A wall-hung heater is to be supported in the intended manner on the black-painted surface of a wall consisting of 3/8-inch-thick (9.5 mm) plywood fastened to both shorter sides of nominal 2- by 4-inch (38- by 89-mm) vertical wooden studs on 16-inch (406 mm) centers. Two or more such walls are to be fastened together to form a 90-degree angle, and the height and length of the walls are to be such that they extend not less than 2 feet (610 mm) beyond the physical limits of the heater. A ceiling surface is to be added consisting of 3/8-inch (9.5-mm) plywood. The heater is to be located as close to the sides of the wall angle as its construction will permit, and it is to be placed relative to the walls that maximum heating will occur on the latter. Heaters intended to be mounted on the wall at or near ceiling height shall be tested in the corner as close to the side walls and ceiling as construction will permit.

40.3.2 A ceiling-hung heater is to be tested in an alcove consisting of the walls described in 40.3.1, with an added ceiling surface of 3/8-inch (9.5-mm) plywood blanketed on top with 4 inches (100 mm) of conventional glass-fiber or mineral-wool insulation having a minimum R factor of 30 or insulation of lesser thickness having a minimum R factor of 30. The heater is to be mounted on or in the ceiling surface as close to the alcove corner as its physical dimensions will permit unless its design and construction are such that other locations would result in more adverse operation, in which case the heater is to be operated in the more adverse location.

40.3.3 Rubber or other material similarly subject to deterioration is to be removed from feet or other supports of a movable heater if the removal of the material is likely to result in higher temperatures being attained on the heater.

40.3.4 If the removal of feet or other supports results in operation of temperature limiting controls during the Normal Temperature Test, such operation is not considered to be unacceptable if, when the test is repeated with the parts replaced in the intended manner, there is no operation of the controls.

40.3.5 A movable heater is to be supported on two layers of white tissue paper on a softwood surface and placed in a corner alcove as described in 40.3.1. The heater is to be placed as close to the side walls of the alcove as its configuration will permit. If a temperature limiting control or thermal link operates when the heater is in such position, the test is to be repeated with the heater moved away from the side walls, in one inch increments, until such time that the temperature limiting control or thermal link does not operate, or until a maximum of 18 inches (457 mm) is attained.

41 Alarm Device Endurance Test

41.1 With regard to 30.1 and 30.2, an audible alarm device and a control which activates the alarm shall withstand without malfunction or breakdown, an endurance test consisting of 6000 cycles of operation at the rate of 1 minute on and 30 seconds off. The test is to be conducted at rated voltage and at the maximum ambient temperature determined during the Normal Temperature Test, Section 40.

41.2 With regard to 30.1 and 30.3, a visual alarm device and a control which activates the alarm shall withstand without burning out or failing to light, an endurance test consisting of 6000 cycles of operation at the rate of 1 minute on and 30 seconds off. The test is to be conducted at the rated voltage and at the maximum ambient temperature determined during the Normal Temperature Test, Section 40.

42 Abnormal Operation Tests

42.1 General

42.1.1 If the conditions of normal operation are not representative also of abnormal conditions likely to be obtained in actual service, a heater shall not become a risk of fire, electric shock or injury to persons when operated continuously under such abnormal conditions as specified in 42.2 – 42.12 with the temperature controls arranged as described in 40.2.

42.1.2 Unless otherwise specified, abnormal operation tests are to be conducted with the heater operating continuously until the ultimate result has been determined. In most cases, continuous operation for 7 to 8 hours will be necessary in order to prove that the ultimate result has been observed.

42.1.3 If the temperature-limiting control or thermal link of a wall or ceiling hung heater, operates at 18 inches (457 mm) from the alcove wall when tested as in 40.3.1 or 40.3.2, all of the abnormal operation tests (overvoltage, stalled fan, padded surface and blanketing, curtain drape, terry cloth drape, and similar tests, usually performed on the heater) are to be repeated while the heater is located in a room having an average temperature of 0°C (32°F).

42.1.4 If the temperature limiting control or thermal link of a movable heater operates at 18 inches (457 mm) from the alcove wall when tested as in 40.3.5, all of the abnormal operation tests (overvoltage, stalled fan, tip over, terry cloth drape, terry cloth band drape, vertical wall, and similar tests, usually performed on the heater) are to be repeated while the heater is located in a room having an average temperature of 0°C (32°F).

42.1.5 The applied voltage and method of hanging or location shall be in accordance with Normal Temperature Tests, Section 40. However, for a heater that employs adjustable controls for heater or fan settings, tests at lower heater and fan settings shall also be conducted if the settings influence operation of a temperature limiting control that operates during any abnormal operation test.

42.1.6 When subject to an abnormal operation test, a heater is considered to involve a risk of fire if there is any emission of embers, flame or molten metal, if there is ignition (see 3.14) of the materials described in 42.1.8 – 42.1.13 or if there is glowing or flaming of the combustible material adjacent to or upon which the heater is placed, including, in the case of the vertical wall test, 42.5, charring with crosschecking of the plywood (see 3.6).

42.1.7 After having been subjected to an Abnormal Operation Test, a heater is considered to involve a risk of electric shock or injury to persons if it appears to be usable and the insulation resistance is less than 50,000 ohms, or the heater does not comply with the requirements in Sections 8 or 9.

42.1.8 Insulation resistance is to be measured between current carrying parts and accessible dead metal parts directly or may be calculated using a circuit that measures voltage drop. In such a circuit, the

voltmeter shall have an internal resistance of at least 30,000 ohms and a minimum 250-volt direct-current supply circuit shall be used.

42.1.9 The cheesecloth mentioned in this standard is bleached cheesecloth 36 inches wide (914 mm), running 14 – 15 yards per pound mass (approximately 28 – 30 m/kg mass), and having what is known to the trade as a count of 32 x 28 – that is, for any square inch, 32 threads in one direction and 28 threads in the other direction (for any square centimeter, 13 threads in one direction and 11 threads in the other direction).

42.1.10 The blanket material mentioned in this standard is 100 percent unbleached cotton flannelette sheet blanket, and is generally available in the 80-by-108-inch (2-by-2.7-m) size.

42.1.11 The white duck material (cotton) mentioned in this standard is to have a mass of 8 ounces per square yard (0.27 kg/m^2).

42.1.12 The felt mentioned in this standard is 100-percent standard-weight, all-cattle-hair, punched felt with center reinforcement consisting of burlap having a mass of 5 ounces per square yard (0.17 kg/m^2). Felt 1 inch (25 mm) thick has a mass of 105 ±15 ounces per square yard (3.56 ±0.51 kg/m^2). Felt 3/4 inch (19 mm) thick has a mass of 79 ±9 ounces per square yard (2.68 ±0.31 kg/m^2).

Exception: SAE J314, Grade F-11, minimum 1 inch (25 mm) thick wool felt may be used as a substitute for the all-cattle-hair mat.

42.1.13 The terry cloth material mentioned in this standard is white, basically cotton terry cloth untreated fabric with a polyester content not more than 20 percent, and having a pile weave and a nominal weight of 9.5 ounces per square yard (320 g/m^2).

42.2 Overvoltage test

42.2.1 The heater it is to be operated at a voltage in accordance with 40.1.12 until constant temperatures are attained, following which it is to be operated for 2 hours at a 12 percent higher voltage.

42.3 Stalled-fan test

42.3.1 A heater that employs a motor-driven air circulating fan shall comply with 42.1, and shall not result in opening a nontime-delay 1/2-ampere fuse, when subjected to the test in accordance with 42.3.2 – 42.3.4.

42.3.2 A heater is to be positioned or located in accordance with the Normal Temperature Tests, Section 40. A 1/2-ampere fuse of other than the time-delay type is to be connected between the accessible dead metal parts (see 52.10) of the heater and the earth ground. The grounded conductor and a grounding conductor, if provided, are to be treated as described in 52.3.

42.3.3 The motor is to be stalled and the heater is to be operated for 7 hours unless a manual reset type temperature limiting control or a thermal cut-off operates to de-energize either all or a sufficient number of heating elements so that there is no longer a risk of fire or development of an electric shock.

42.3.4 For a heater that employs adjustable heat setting controls, this test shall also be conducted at other than maximum rated input if the other settings influence operation of an auxiliary temperature control or a temperature limiting control.

42.4 Tip-over test

42.4.1 A movable heater shall be subjected to this test. The heater is to be operated until constant temperatures are attained. It shall be then overturned onto a softwood surface covered with a single layer of terry cloth and shall be operated under the most severe conditions that would result when it comes to rest, without further guiding or propping, after having been pushed over.

42.4.2 All orientations are to be tested. However, if a given orientation or position of the heater presents less likelihood of a risk of fire than when the heater is evaluated in accordance with other requirements in the standard, the orientation or position need not be reevaluated under 42.4.1.

42.4.3 For a heater which contains a confined heat transfer fluid, and is intended to be shipped with the legs or base detached, the test is to be conducted with the legs or base installed as well as detached.

42.4.4 If a heater incorporates a tipover switch of other than the type indicated in 40.2.3, it shall be evaluated according to 33.18 for each orientation or position of the heater in which the switch is relied upon to prevent a risk of fire.

42.5 Vertical-wall test

42.5.1 A movable heater shall be operated at a distance from the wall that results in the highest temperature on the wall. The highest temperatures are usually encountered at the closest distance a heater can be placed to the wall, except that:

a) A temperature limiting control or an auxiliary temperature control may operate and not permit operation of the heater for sufficient length of time to produce the highest temperatures. In this case additional tests are to be conducted at increased distances between the heater and the wall. The test time at each distance is to be sufficient to observe the ultimate results. See 42.5.2.

b) If a radiant type heater is provided with a reflector, the reflector may have a focusing effect that causes higher temperatures at a greater distance than the minimum distance between the heater and the wall. In this case additional tests are to be conducted at increased distances. The test time at each distance is to be sufficient to observe the ultimate results. See 42.5.2.

42.5.2 With respect to 42.5.1, to observe the ultimate results, the test is to be continued for 7 hours. However, the test may be discontinued after 2 hours if this duration of testing produces no discoloration of the terry cloth material.

42.5.3 The heater is to be supported on a horizontal surface that abuts the vertical wall. The side of the heater that radiates or convects heat is to face the wall. The wall is to consist of 3/4-inch (19.1-mm) thick fir plywood, and is to be covered with one layer of terry cloth material. The wall is to be constructed so the grain of the plywood runs in the horizontal direction. The wall is to extend at least 12 inches (305 mm) beyond the heater on both sides and 12 inches above the heater. Any heater projections such as guards or grilles in the front of the heater that do not require tools for their removal (see 10.1.1) are to be removed.

42.5.4 For a heater that includes a stand or feet that project beyond other heater surfaces in front of the heater, the wall is to include a recessed "toe space" next to the floor. The "toe space" shall be 3-1/4 inches (82.6 mm) deep, 4-1/4 inches (107.9 mm) high which, with respect to the heater feet or stand, determines the closest distance the heater can be placed to the wall. The terry cloth material is to be applied to the vertical wall such that it extends to the floor, draping over the "toe space" opening. When the heater is inserted, the terry cloth will contour the stand or feet of the heater.

Exception: For a heater that may be used at an elevated location (see 3.11) and that includes a stand or feet that project beyond other heater surfaces in front of the heater and that is provided with air outlet

openings lower than 4-1/4 inches from the floor, the height of the "toe space" is to be adjusted to a minimum height permitted by the stand or feet.

42.5.5 For a heater that is not provided with a stand or feet that project beyond other heater surfaces in front of the heater, the wall is to extend straight to the floor without a "toe space" and the heater is to be placed flush against the wall.

Exception: A heater that may be used at an elevated location that includes a stand or feet that extend beyond the front of the heater shall be tested using a wall that includes a "toe space" as described in 42.5.4 and also using a wall without a "toe space".

42.6 Terry cloth drape test

42.6.1 A heater of other than the ceiling-hung type is to be operated until constant temperatures are attained and then covered with a single layer of terry cloth. The test is to be repeated (if acceptable results are obtained for the initial condition) beginning with the heater at room temperature (25 ±3°C). The tests under the two conditions may be combined by initially draping the heater, and after equilibrium conditions are obtained, replacing the terry cloth with a new single layer.

Exception: The temperature-regulating control may be returned to the circuit during the test starting from room temperature if the heater does not employ an automatic reset type temperature limiting control.

42.6.2 A heater provided with an auxiliary temperature control or a temperature limiting control or thermal link that does not operate due to partial draping of the heater shall also be subject to the Terry Cloth Drape Test under such partial draping conditions.

42.6.3 A heater designed to be supported by and mounted away from a wall or ceiling in a horizontal position is to be tested in the intended position with a single layer of terry cloth draped over the full length of the heater and hanging down approximately 1 foot (305 mm) on each side.

42.6.4 In a test to determine whether a combination heater and motor-driven fan complies with the requirement in 42.6.1, the fan is to be operating when the heater is covered with terry cloth. If the motor is separately controlled, the test is to be repeated with the fan motor in the off position.

42.6.5 The lower edge, or edges, of the terry cloth shall hang freely without any added constraint so that the heated air discharge may cause the terry cloth to billow away from the heater. If necessary, the uppermost portion of the terry cloth is to be taped or otherwise secured to the top of the heater or the wall above the heater to prevent the terry cloth from being blown off the heater.

42.7 Terry cloth band drape test

42.7.1 A movable heater that is designated for use at an elevated location or because of its size and weight is likely to be used at an elevated location (see 3.11) shall be subjected to the Terry Cloth Band Drape Test before and also after it is subjected to the Drop Test, Section 53, provided it is operational after the drop test.

42.7.2 The terry cloth material is to be in accordance with 42.1.13. The terry cloth material is to be folded to form a six-layer band, 6 inches (152 mm) wide. Except as stated in 42.7.8, the layered band is to be of sufficient length to extend vertically over two opposite sides and the top of the heater and include allowance for offset folds and at least a 3 inch (76.2 mm) overlap on the floor at both ends when the band is applied in accordance with 42.7.4 and 42.7.7 – 42.7.9. If the band slides off the heater due to the force of gravity, it is to be supported to maintain its position for test purposes. The support shall not restrict the heater airflow. After the initial positioning the band shall not be repositioned if it is deflected by the heated air discharge.

42.7.3 With respect to the draping in accordance with 42.7.4 and 42.7.7 – 42.7.9, the width of the heater is considered that portion of the heater through which heated air is delivered or heat is radiated.

42.7.4 The terry cloth band is to be applied so that it contours the heater over two vertical or near vertical sections of the heater and extends across the top of the heater. One of the vertical sections is to extend over the front of the heater to cover the opening or openings through which heated air is delivered or heat is radiated. The other vertical section is to be applied so that it covers one of the following sections of the heater. Depending on the construction of the heater, all of these applications are to be tested, one at a time, unless it can be determined without testing which of the applications will produce the most adverse effects, in which case the most adverse applications only need to be tested.

a) The section in the back of the heater directly opposite the front section covered by the band.

b) A section of the heater which includes air intake openings that may be either on the back of the heater not directly opposite the band section in the front of the heater, or on the side of the heater. Any offsets required in the band, except as indicated in 42.7.8, are to be made by a single fold on top of the heater.

42.7.5 The heater is to be operated initially at least 15 minutes at maximum rated wattage in accordance with the Power Input Test, Section 38. The heater is then to be draped with the terry cloth band in accordance with 42.7.4 and 42.7.7 – 42.7.9 and operated continuously for 7 hours or until:

a) One half hour after a manual reset type temperature limit control or a thermal cut-off operates to de-energize either all or a sufficient number of heating elements so that there is no longer a risk of fire or development of an electric shock; or

b) Thermal stabilization occurs and there is no discoloration of the terry cloth material.

42.7.6 If the heater includes adjustable settings for heat output, other than maximum setting, these other settings are also to be tested, unless it can be determined without testing that the maximum setting will produce the most adverse conditions.

42.7.7 With respect to 42.7.5, at least the following test conditions are to be included with the terry cloth band draped over the heater. See 42.7.2.

a) The band placed to cover the center of the width of the heater and extended to cover the top of the heater and the corresponding part of the opposite side.

b) The band placed to cover one half of the width of the heater and extended to cover the top and the corresponding part of the opposite side. For a heater that is more than 12 inches (305 mm) wide so that the 6 inch (152 mm) wide band does not cover one half of the width of the heater, the band is to be placed so that one edge is even with the vertical center line of the width.

c) The band placed to cover one fourth of the width of the heater and extended to cover the top and the corresponding part of the opposite side of the heater. For a heater that is more than 24 inches (609 mm) wide so that the 6 inch wide band does not cover one fourth of the width of the heater, the band is to be placed so that one edge is even with one edge of the width.

d) The tests specified in (b) and (c) are to be repeated with the other half of the heater covered.

e) If the width of the heater is more than 24 inches (61 cm) wide so that placement of the terry cloth band in accordance with (b), (c), and (d) will not cover tests on all sections of the width, additional tests are to be conducted with the band placed so that it is centered on the part of the width of the heater not covered by (b), (c), and (d).

f) If a heater includes air intake openings on other sections of the heater that are not included in the width of the heater (see 42.7.3), the test described in (c) and the corresponding test on the other

half of the width of the heater are to be repeated with the band extended to cover the top and the section of the heater with these air intake openings, as specified in 42.7.4(b).

42.7.8 With reference to 42.7.7, if it is discovered during the testing that a location of the band different than specified in (a – f) may produce more adverse effects due to placement of temperature limiting controls or projecting heater surfaces, the placement of the band is to be modified to cover the more adverse conditions. In heater constructions where the intake openings are in the front section of the heater or to the side of the heater outlet opening or where the intake openings are in the front section of the heater and to the side of the heater outlet opening, this may necessitate a double fold in the terry cloth material. However, except for the folds on the top of the heater, the band placement is to be vertical or near vertical with respect to the heater, contouring the heater enclosure and its projections, if any. The bottom edge of the terry cloth band shall be raised to any position above the supporting surface if doing so produces a more adverse effect than when the edge is touching or laying on the supporting surface.

42.7.9 If a heater is provided with vertical guards or grille members in the front of the heater that do not permit placement of the entire width of the 6 inch (152 mm) wide band in parallel with the heater surfaces, tests are to be conducted so that portions of the bands penetrate between the vertical guards as far as permitted by the guards or other parts of the heater.

42.7.10 For all drapings specified in 42.7.7 – 42.7.9, the terry cloth is to be allowed to fall naturally over the heater and not forced. However, for testing a heater provided with vertical guards or grille members, the terry cloth can be turned sideways to penetrate between the guards or grille members more easily.

42.8 Wall-hung heaters

42.8.1 General

42.8.1.1 Unless marked in accordance with 67.13 or 67.15, a wall-hung heater, shall be tested in accordance with 42.8.2.1 – 42.8.3.1.

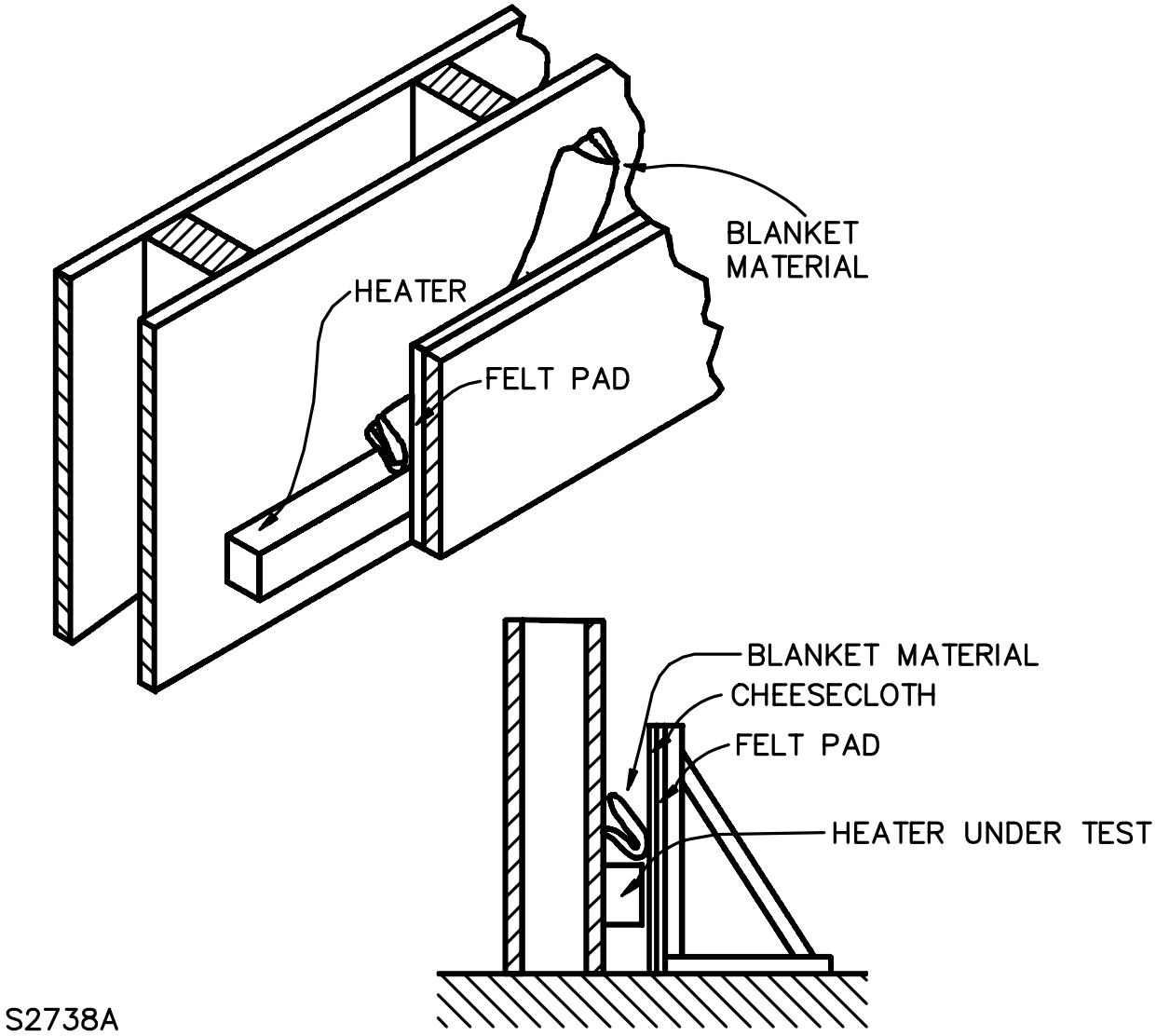
42.8.2 Padded surface and blanketing

42.8.2.1 A wood surface covered with a 1 inch (25 mm) thick felt pad, and with the pad, in turn, covered by a double layer of cheesecloth, is to be supported in a vertical position as near the heater as the construction of the latter will permit. The heater is to be covered to such an extent as to produce maximum heating of the cheesecloth, and the padded surface is to extend at least 3 inches (76 mm) above the top surface of the heater. During the test, the covered wood surface is to be moved horizontally 1/2 inch (13 mm) away from its initial position and operation continued until temperatures stabilize. If it is determined that its temperature increases when the surface is moved horizontally, the test is to be repeated with the surface in the new position starting with the heater at approximately room ambient temperature. The wood surface is to be of sufficiently rigid construction so that it will not change shape (bow or warp) during the test.

42.8.2.2 While still operating as described in 42.8.2.1 with the padded vertical surface in its initial position in front of the heater, four thicknesses of loosely folded cotton blanket material are to be introduced into the space between the vertical padded surface and the vertical wall on which the heater is hung in such a manner that the upper slot of the heater is blocked. The folded blanket material is to be located at any points along the length of the heater installation in such a manner that any sensing device provided is so exposed as to produce the most adverse operating conditions. A length of folded material up to a maximum of 80 inches (2 m) is to be used, but a shorter length of the material may be introduced into the space at any one time to obtain the most adverse operating conditions possible. Operation in any one blocked condition is to be continued until constant temperatures are obtained, or until glowing or flaming of the cotton blanket material results. A typical test setup is shown in Figure 42.1.

Figure 42.1

Test of wall-hung heater



42.8.3 Curtain drape

42.8.3.1 The upper edge of a simulated curtain at least 3 feet (0.9 m) high, but long enough to be supported at least 1 foot (300 mm) above the heater in any case, is to be continuously attached to the wall at the base of which the heater is installed. The curtain is to consist of white duck as specified in 42.1.11 and an overlay of a double layer of cheesecloth on the side facing the heater, and is to be hung so that the lower edge just touches the floor. During the test, the entire length of the heater is to be initially covered and the curtain is to be arranged to conform as closely as possible with the contour of the heater. Those sections judged to be least likely to affect the operation of the temperature limiting control are to be covered. This test shall then be repeated with first:

a) 3/4 of the heater covered, then with

b) 1/2 of the heater covered, and then with

c) 1/4 of the heater covered.

Each test shall be conducted with the heater at room ambient at the start of the test.

42.9 Abnormal ambient test

42.9.1 General

42.9.1.1 A heater that employs an automatic reset auxiliary temperature control or a temperature limiting control in accordance with (a) of exception to 29.1 shall be subjected to an abnormal ambient test in accordance with either Condition 1 or Condition 2 as specified in 42.9.2 and 42.9.3, respectively. The test is to be continued for 7 hours with the heater operated at the maximum rated input. Subsequent to this test, the heater shall comply with the Normal Temperature Tests, Section 40.

Exception No. 1: The abnormal ambient test need not be conducted for a heater in which the average "on" time per cycle over four cycles of operation on the auxiliary temperature control or the temperature limiting control, whichever results in actuation of an alarm, during each abnormal operation temperature test does not exceed 5 percent and the average "on" time does not exceed 1 minute.

Exception No. 2: The abnormal ambient test need not be conducted if:

a) The heater completes the full 7 hour terry cloth band drape test,

b) During the full terry cloth band drape test temperatures are measured as noted in the Normal Temperature Tests, Section 40, and

c) The temperatures measured during the normal temperature test are equal to or greater than the temperatures obtained during the terry cloth band drape test with the product operating on the auxiliary temperature control or the limiting control, whichever results in actuation of an alarm.

Exception No. 3: The abnormal ambient test need not be conducted if the heater:

a) Complies with the locked rotor test (see 42.3.1 – 42.3.4) and temperatures are measured as noted in the Normal Temperature Tests, Section 40, and

b) If the steady state temperatures measured during the normal temperature test are equal to or greater than the temperatures obtained during the locked rotor test with the product operating on the auxiliary temperature control or temperature limiting control, whichever results in actuation of an alarm. The overshoot temperatures are not to be considered if they last for less than 5 minutes.

Exception No. 4: A heater employing an automatically reset auxiliary temperature control need not be provided with an alarm if the heater complies with 40.1.1 (normal temperature tests) when operated with the auxiliary temperature control operational and with the temperature limiting control bypassed under the abnormal operation conditions specified in 42.2 – 42.12.

42.9.2 Abnormal ambient test – condition 1

42.9.2.1 The heater is to be placed in an enclosure where the ambient can be elevated and accurately maintained while the heater is operating. The ambient is to be raised slowly until the auxiliary temperature control or the temperature limiting control operates. The control is then to be shunted out of the circuit and the heater is to be operated at the ambient at which the control operated, plus or minus 10°F (5.6°C) for 7 hours.

42.9.3 Abnormal ambient test – condition 2

42.9.3.1 Air heated by a controlled temperature source is to be directed to the air intake openings of the heater using air ducts or other similar means. The temperature of the air is to be gradually increased until the auxiliary temperature control or the temperature limiting control operates. The control is then to be shunted out of the circuit and the heater is to be operated for 7 hours with the intake air maintained at the temperature at which the control operated, plus or minus 10°F (5.6°C).

42.10 Motor overload and stalled motor – motors protected by a remote protective device

42.10.1 A motor protected by a remote protective device in accordance with 26.1(b) shall not burn out nor shall there be other evidence of risk of fire when tested in accordance with 42.10.2 – 42.10.6.

42.10.2 The motor and its protective device are to be connected in the intended manner to a supply circuit having a voltage in accordance with 40.1.9. Temperatures are to be measured by thermocouples secured to the surface of the motor coils.

42.10.3 The motor and its protective device are to be tested in the ambient encountered in the operation of the heater in which the motor and its protective device are employed as determined during the applicable normal temperature test.

Exception No. 1: A motor that encounters an ambient higher than normal room ambient, 25 – 26°C (77 – 79°F), during the applicable normal temperature test may be tested in a lower ambient. However, the maximum allowable temperatures specified in 42.10.4 and 42.10.5 are to be reduced by the difference between the ambient encountered in intended operation and the test ambient.

Exception No. 2: An ambient compensated protective device may be tested in any ambient from 25 – 50°C (77 – 122°F).

42.10.4 When a motor is operating under the maximum load that it can carry without causing the protective device to function, the winding temperature shall not exceed 140° C (284° F) for a Class A insulated motor or 165°C (329°F) for a Class B insulated motor.

Exception: A motor moving air only by means of a fan or blower directly attached to the motor shaft need not comply with this requirement.

42.10.5 When the rotor of a motor is locked, the winding temperature for a Class A insulated motor shall not exceed 200° C (392° F) during the first hour of operation and 175° C (347° F) thereafter. After the first hour of operation, the average temperature (that is, the average of (1) the arithmetic mean of the maximum temperatures and (2) the arithmetic mean of the minimum temperatures) shall not exceed