### 35.3 Circulator or auxiliary-control circuit

35.3.1 The interconnection of a controller to a separate furnace fan, boiler pump, or the like, shall be by means of an isolated contact that is to be connected only to the fan or pump controls so as not to require rewiring or adding a power supply to the separate equipment. The controller shall be marked accordingly.

## 36 Interconnection of Class 2 Circuits

36.1 The output of a transformer supplying a Class 2, low-voltage circuit and provided as a part of the equipment shall not be interconnected with the output of another such transformer. See 73.6.

*Exception: The output of two or more transformers provided as a part of the equipment may be interconnected if the voltage and current measurements at the output terminals are within the values for a single Class 2, 30-volt or less transformer.*

36.2 The outputs of two or more transformers, all of which are evaluated as Class 2 in accordance with 6.2 and that are not interconnected, are to be considered as separate circuits.

36.3 If the wiring terminals or leads for two or more Class 2 circuits are located in the same wiring compartment, the compartment shall be such that ample room is provided for proper wiring without crowding, and such that the stowed wiring of one circuit will not be forced against terminals or live parts of another circuit. The equipment shall be marked in accordance with 75.8.

## 37 Barriers

37.1 A barrier used to provide separation between the wiring of different circuits shall be of metal or of insulating material having the necessary mechanical strength if exposed or otherwise likely to be subjected to mechanical damage, and shall be held in place.

37.2 Unclosed openings in a barrier for the passage of conductors shall not be larger than 1/4 inch (6.4 mm) in diameter and the number of openings shall not be more than the number of conductors that will need to pass through the barrier. The closure for any other opening shall have a smooth surface wherever an insulated wire may contact it and the area of any such opening, with the closure removed, shall not be larger than required for the passage of the necessary wires. See 18.1.20.

37.3 A barrier used to provide separation between the field wiring of one circuit and the wiring or uninsulated live parts of another shall not be spaced more than 1/16 inch (1.6 mm) from the enclosure walls and from interior mechanisms and component-mounting panels, or the like, that serve to provide segregated compartments.

37.4 A metal barrier used to provide segregation shall have the necessary strength and rigidity, and shall be at least the thickness specified under the column in Table 7.1 titled "With supporting frame or equivalent reinforcing," for the dimensions of the barrier.

37.5 A barrier of insulating material shall be of such thickness and be so supported that it cannot be readily deformed so as to defeat its purpose; in any case, the thickness shall not be less than 0.028 inch (0.71 mm).

37.6 A barrier between uninsulated live parts connected to different circuits, and a barrier between uninsulated live parts of one circuit and the wiring of another circuit shall also comply with the requirement in 29.2.11 and 29.2.12.

## PROTECTION AGAINST INJURY TO PERSONS

### 38 General

### 38.1 Scope

38.1.1 The requirements in 38.2.1 – 38.7.8 apply to equipment, the normal operation of which may involve a risk of injury to persons.

38.1.2 There are risks of injury to persons inherent in some equipment that, if completely eliminated, would defeat the utility of the equipment. The requirements in this section are intended to reduce such risks, while retaining the intended function of the equipment.

### 38.2 Sharp corners and edges

38.2.1 An enclosure, a frame, a guard, a handle, or the like, shall not be sufficiently sharp to constitute a risk of injury to persons in normal maintenance and use.

*Exception: This requirement does not apply to a part or portion of a part needed to perform a working function.*

### 38.3 Moving parts

38.3.1 A hinged or pivoted panel or cover shall be positioned or arranged so that it is not subject to falling or swinging due to gravity or normal vibration in such a manner as to cause injury to persons by the panel or cover, by other moving parts capable of causing injury to persons, or by uninsulated live parts.

### 38.4 Enclosures and guards

38.4.1 The rotor of a:

a) Motor,

b) Pulley,

c) Belt,

d) Gear,

e) Chain,

f) Fan, or

g) Other moving part

that could cause injury to persons, shall be enclosed or guarded to reduce the risk of unintentional contact with the moving part.

38.4.2 A moving part that may involve a risk of injury to persons shall comply with the requirements specified in Table 12.1, and shall be considered with regard to:

a) The degree of exposure,

b) The sharpness of the moving part,

c) The risk of unintentional contact with the moving part,

d) The speed of the moving part, and

e) The risk that:

1) A part of the body could be endangered by the moving part or

2) Clothing could be entangled, resulting in a risk of injury to persons.

38.4.3 Unless it complies with 50.1, a guard or enclosure for a moving part capable of causing injury to persons shall be secured to the equipment so that it cannot be removed without using a tool.

### 38.5 Surface temperatures

38.5.1 During the Temperature Test, Section 42, the maximum temperature of a handle, lever, button, or knob that is contacted by a user during normal operation shall not exceed 60°C (140°F) for a metal surface or 85°C (185°F) for a nonmetallic surface.

38.5.2 With reference to 38.5.1, a handle, a lever, a button, a knob, or the like, made of a material other than metal, that is plated or clad with metal 0.005 inch (0.13 mm) thick or less shall be evaluated as a nonmetallic part.

38.5.3 The maximum temperatures specified in 38.5.1 do not apply to equipment intended specifically for use in an ambient temperature exceeding 85°C (185°F).

### 38.6 Mounting devices

38.6.1 Equipment weighing more than 5 pounds (2.3 kg) and relying on a mounting means other than its own enclosure, if malfunction of the mounting means will result in a risk of injury to persons, shall withstand for 1 minute, without dislocation of the mounting means or evidence of damage, a force as described in 38.6.2.

38.6.2 With the equipment mounted in accordance with the manufacturer's instructions, a force equal to three times the weight of the equipment but not less than 20 pounds-force (89 N) is to be applied through the approximate center of gravity of the equipment. The force is to be increased gradually to reach the required value in 5 – 10 seconds and is to be maintained at that value for 1 minute.

### 38.7 Strength of parts

38.7.1 A device that is actuated by an external source of pressure and that employs a Bourdon tube, a flexible metal bellows, a diaphragm, or the like, rated 300 psig (2068 kPa) or more and not contained within an enclosure, shall withstand for 1 minute the hydrostatic pressure specified in 38.7.2 without bursting, leakage, or rupture.

*Exception: Certain leakage conditions may occur only as indicated in 38.7.3 – 38.7.7.*

38.7.2 To determine whether a part complies with the requirement in 38.7.1, a sample shall be subjected to a hydrostatic pressure test. The sample is to be filled with water to exclude air and is to be connected to a hydraulic pump. The pressure is to be raised gradually to four times the maximum rated operating pressure of the device.

38.7.3 Leakage at a gasket or fitting during the hydrostatic pressure test may occur unless it occurs at a pressure 50 percent or less of the required test pressure.

38.7.4 If leakage occurs during the test, the test is to be continued to four times the maximum rated operating pressure of the device, test equipment permitting. If the leakage is due to external fittings, modifications may be made to permit completion of the test.

38.7.5 A Bourdon tube, a flexible metal bellows, a diaphragm, or the like that is contained within an enclosure shall comply with the requirement in 38.7.1 or shall:

a) Withstand for 1 minute without visible leakage a hydraulic pressure in accordance with the second column of Table 38.1; and

b) Except as indicated in 38.7.7, withstand a hydraulic pressure for 1 minute equal to four times the maximum rated operating pressure of the device without rupture that may present a risk of injury to persons.

**Table 38.1**
**Test pressures for devices with enclosures**

| Marked maximum operating-pressure rating, psig (kPa) | Test pressure for | |
|---|---|---|
| | 38.7.5(a) | 38.7.7(a) |
| 300 – 2000<br><br>(2068 – 137,900) | 2 times maximum rated operating pressure | 3 times maximum rated operating pressure |

38.7.6 With reference to 38.7.5(b), a Bourdon tube, diaphragm, or bellows may split if no part is released outside the enclosure; a joint or a gasket may leak if the required pressure value is reached and maintained for 1 minute, a leaking gasket or flexible member may be replaced by a heavier disc to permit the required pressure value to be reached.

38.7.7 With reference to 38.7.6, if leakage becomes excessive so that the four-times pressure cannot reasonably be reached – that is, if the part functions as if it has a rupture disc – the part complies if:

a) A pressure in accordance with the third column in Table 38.1 is reached;

b) No part capable of causing injury to persons is released outside the enclosure; and

c) It can be demonstrated by test – which may be at a low pressure – or otherwise, that the outer enclosure can either relieve a pressure equal to the maximum rated operating pressure of the device without rupture that presents a risk of injury to persons, or can withstand a pressure equal to the maximum rated operating pressure.

38.7.8 A pressure vessel, a compressed air filter, a piston operator, or similar device shall withstand hydrostatic strength tests consistent with the intended use unless it is certified by the National Board of Boiler and Pressure Vessel Inspectors and bears an ASME Code inspection symbol other than the UM symbol.

## 39 Protection of Users and Service Personnel

### 39.1 General

39.1.1 The requirements in this section do not apply to live parts in low-voltage circuits as defined in 5.6.

39.1.2 Live parts shall be arranged and covers located so that persons are not likely to be exposed to a risk of electric shock while removing and replacing a cover.

39.1.3 Live parts shall be:

a) Recessed at least 1/8 inch (3.2 mm) from the plane of the front of the fixed portion of an enclosure;

b) Recessed at least 1/8 inch from the front edge of a wiring compartment, in the case of equipment mounted to the face of a wiring compartment; or

c) Provided with equivalent protection by projections or guards.

39.1.4 To determine whether live parts recessed or protected in accordance with 39.1.3 comply with the requirement in 39.1.2, the cover is to be removed and replaced. Contact of either a person or a conductive cover with a live part shall not occur.

39.1.5 Unless a cover complies with the requirements for hinged covers in 7.2.4 and 7.2.7, and unless all live parts are protected as specified in 39.1.6, a handle, a knob, or other manual operating means shall be arranged so that it can be operated from outside the enclosure. The position of such an operating means shall be marked, if necessary, as a guide for proper operation.

*Exception: Equipment that involves manual operations that may be performed by a user only at the time of installation, during a servicing procedure, or seasonally, need not comply provided that it complies with the requirements in 39.1.6, 39.2.3, 39.2.5, 39.3.2, and 39.3.3. The requirements in Bonding of Internal Parts, Section 20, apply in any case.*

39.1.6 An uninsulated live part or a moving part capable of causing injury to persons shall be located, guarded, or enclosed so as to reduce the risk of contact with such part by a person while changing a lamp or fuse, lubricating a motor, adjusting a control, or during other normal operations, including those performed only at the time of installation, during a servicing procedure, or seasonally.

39.1.7 A live heat sink for a solid-state component, a live relay frame, and the like, shall comply with 39.1.6, 39.2.2, and 39.3.2, and unless the equipment is marked in accordance with 75.6, shall also be guarded to reduce the risk of contact by persons, regardless of the location of the parts.

*Exception: As provided in 39.1.9 and 39.1.10.*

39.1.8 With reference to 39.1.7, the size, shape, material, and color give a heat sink or relay-frame the appearance of a dead metal part. Other live parts that can be mistaken as being dead parts are to be evaluated similarly.

39.1.9 A guard, baffle, or cover that can be removed without a tool is to be removed when determining whether a part is exposed to contact by a user. A part that can be contacted by a 3/8-inch (9.5-mm) diameter rod having a hemispherical end inserted through an opening in a permanently attached guard or baffle for a distance of 4 inches (102 mm) is considered to be exposed for the purpose of protecting persons.

*Exception: A snap-on cover that complies with the requirements in the Cover Retention Test, Section 62, need not be removed.*

39.1.10 A part on the back side of a component mounting panel or located so that major disassembly by using a tool is necessary to expose it is not considered to be exposed to a user; such a part is not considered to be exposed to service personnel unless it is likely that servicing will be performed while the part is energized after disassembly.

39.1.11 If a marking or an operating instruction refers a user to a hole or opening in an enclosure through which a tool is to be inserted for adjustment or a similar purpose, it shall not be possible to contact an uninsulated live part through the hole or opening with a 1/16-inch (1.6-mm) diameter rod.

## 39.2 Mechanical servicing

39.2.1 The requirements in 39.2.2 are intended to provide a reasonable degree of protection to service personnel performing a mechanical function on energized equipment. Such a service function does not in itself cause exposure to live parts or moving parts capable of causing injury to persons, but it is commonly necessary to perform the function with the equipment energized.

39.2.2 An uninsulated live part or a moving part capable of causing injury to persons shall be located, guarded, or enclosed so as to reduce the risk of unintentional contact by service personnel adjusting or resetting a control, or performing a mechanical service function that may have to be performed with equipment energized.

39.2.3 Mechanical service functions that may have to be performed with equipment energized include operating a valve or connecting a fitting that may be necessary during charging or adjusting a pneumatic system, adjusting the setting of a temperature or pressure control with or without marked dial settings, resetting a control trip mechanism, operating a manual switch, or lubricating a motor. A control that has the set point sealed at the factory and that does not have marking or instructions for adjustment is not considered to be adjustable.

39.2.4 The requirements in 39.2.2 do not apply to a mechanical service function that is not normally performed with equipment energized.

39.2.5 An adjustable or resettable electric control or manual-switching device may be located or oriented with regard to uninsulated live parts so that manipulation of the mechanism for adjustment, resetting, or operation can be accomplished in the normal direction of access if uninsulated live parts are not located:

a) In front (in the direction of access) of the mechanism and

b) Near any side or behind the mechanism, unless guarded.

## 39.3 Electrical servicing

39.3.1 The requirements in 39.3.2 require that certain electrical components within an overall assembly be located so that the necessary space is provided for working on the components while the equipment is energized.

39.3.2 An electrical component that may need to be examined, adjusted, serviced, or maintained while the equipment is energized shall be located and mounted with regard to other components and with regard to grounded metal parts so that it is accessible for electrical servicing without subjecting service personnel to a risk of electric shock or to a risk of injury to persons by adjacent moving parts. Access to a component shall not be impeded by other components or by wiring.

39.3.3 Compliance with 39.3.2 may be obtained by mounting control components in an assembly so that unimpeded access to each component is provided through an access cover or panel in the outer cabinet, if provided, and the cover of the control assembly enclosure.

39.3.4 Electrical components to which 39.3.2 and 39.3.3 apply include:

a) Fuses;

b) Adjustable or resettable overload relays;

c) Manual or magnetic motor controllers;

d) Magnetically operated relays;

e) Adjustable or resettable pressure or temperature controllers;

f) Manual switching devices;

g) Clock timers; and

h) Incremental-voltage tap and motor-speed tap terminals for variable-speed motors.

Such components in a limited-energy circuit of 30 volts or less shall comply with 39.3.2 in their relation to bare live parts in a circuit of greater energy level and to moving parts capable of causing injury to persons.

39.3.5 The following are not considered to be uninsulated live parts:

a) Coils of controllers, relays and solenoids, and transformer windings, if the coils and windings are provided with insulating overwraps at least 1/32 inch (0.8 mm) thick, or the equivalent, in accordance with 29.2.6;

b) Enclosed motor windings;

c) Terminals and splices with insulation that complies with the applicable requirements; and

d) Insulated wire.

39.3.6 A device having exposed Class 2 outputs that:

a) May be contacted during normal operation or servicing and

b) Have clearances between the Class 2 circuit and an overvoltage protected line-voltage circuit that have been evaluated in accordance with Clearance B requirements in the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840,

shall be provided with a mechanism to indicate the failure of the overvoltage protective device or system. For example, the provision of a detection circuit that would indicate a transient voltage surge suppressor is no longer functional due to the absorption of an excessive amount of energy.

## PERFORMANCE

### 40 General

40.1 The performance of energy management equipment shall be investigated by subjecting a representative sample or samples in commercial form to the tests described in Sections 41 – 67. Consideration shall be given to heat-sink construction, solid-state-device ratings, and other construction criteria in selecting samples for testing that are representative of a line of similarly constructed equipment.

40.2 Unless otherwise noted, tests shall be conducted at rated frequency and at the test potential specified in Table 40.1.

**Table 40.1**
**Values of voltage for tests**

| Voltage rating of equipment and corresponding test potential, volts[a] | | | | |
|---|---|---|---|---|
| 110 – 120 | 220 – 240 | 254 – 277 | 440 – 480 | 550 – 600 |
| 120 | 240 | 277 | 480 | 600 |
| [a] If the rating of the equipment does not fall within any of the indicated voltage ranges, it is to be tested at its rated voltage. | | | | |

## 41 Power Input Test

41.1 The power input to the equipment shall not exceed the marked rating by more than 10 percent when it is operated under the conditions of normal use while connected to a supply circuit as specified in Table 40.1.

## 42 Temperature Test

42.1 When tested as described in this section, the equipment shall not attain a temperature at any point sufficiently high to constitute a risk of fire, to damage any materials employed in the equipment, or to exceed the temperature rises specified in Table 42.1.

**Table 42.1**
**Maximum temperature rises**

| Materials and components | °C | (°F) |
|---|---|---|
| A. INSULATION SYSTEMS | | |
| 1. Insulation systems on coil windings of an AC motor having a frame diameter[a] of 7 inches (178 mm) or less, but not including a universal motor; and on vibrator coils:[b,c] | | |
| (a) Class A Insulation Systems | | |
| In an open motor: | | |
| Thermocouple or resistance method | 75 | (135) |
| In a totally enclosed motor: | | |
| Thermocouple or resistance method | 80 | (144) |
| (b) Class B Insulation System | | |
| In an open motor and on vibrator coils: | | |
| Thermocouple or resistance method | 95 | (171) |
| In a totally enclosed motor: | | |
| Thermocouple or resistance method | 100 | (180) |
| 2. Insulation systems on coil windings of an AC motor having a frame diameter[a] of more than 7 inches (178 mm), of a DC motor, and of a universal motor:[b] | | |
| (a) Class A Insulation Systems | | |
| In an open motor: | | |
| Thermocouple method | 65 | (117) |
| Resistance method | 75 | (135) |
| In a totally enclosed motor: | | |
| Thermocouple method | 70 | (126) |
| Resistance method | 80 | (144) |

**Table 42.1 Continued on Next Page**

## Table 42.1 Continued

| Materials and components | °C | (°F) |
|---|---|---|
| (b) Class B Insulation Systems | | |
| In an open motor: | | |
| Thermocouple method | 85 | (152) |
| Resistance method | 95 | (171) |
| In a totally enclosed motor: | | |
| Thermocouple method | 90 | (162) |
| Resistance method | 100 | (180) |
| B. COMPONENTS | | |
| 1. Capacitors: | | |
| (a) Electrolytic[d] | 40 | (72) |
| (b) Other Types[d] | 65 | (117) |
| 2. Field-wiring terminal[e] | 50 | (90) |
| 3. Solid contacts, busses, and connecting bars[f] | 65 | (117) |
| 4. Fuse clip | 65 | (117) |
| 5. Printed-wiring board[g] | | |
| 6. Power-switching semiconductor (triac, SCR, or the like)[h] | – | – |
| 7. Rectifier: | | |
| (a) Selenium[i] | 50 | (90) |
| (b) Silicon[i] | 75 | (135) |
| 8. Windings of a relay, solenoid, and coil (except motor coil windings and transformers) with: | | |
| (a) Class 105 insulation systems: | | |
| Thermocouple method[b] | 65 | (117) |
| Resistance method | 85 | (153) |
| (b) Class 130 insulation systems:[b,c] | | |
| Thermocouple method | 85 | (153) |
| Resistance method | 105 | (189) |
| 9. Sealing compound[j] | – | – |
| 10. Epoxy[i] | 65 | (117) |
| 11. Transformer: | | |
| (a) Class 105 insulated systems: | | |
| Thermocouple method | 65 | (117) |
| Resistance method | 75 | (135) |
| (b) Class 130 insulation systems:[c] | | |
| Thermocouple method | 85 | (153) |
| Resistance method | 95 | (171) |
| 12. Rubber- or thermoplastic-insulated wire and cord[i,k] | 35 | (63) |
| C. ELECTRICAL INSULATION – GENERAL | | |
| 1. Fiber employed as electrical insulation | 65 | (117) |
| 2. Phenolic composition employed as electrical insulation or as a part the deterioration of which may result in a risk of fire or electric shock: | | |
| (a) Laminated[i] | 100 | (180) |

Table 42.1 Continued on Next Page

**Table 42.1 Continued**

| Materials and components | °C | (°F) |
|---|---|---|
| (b) Molded[i] | 125 | (225) |
| 3. Varnished-cloth insulation | 60 | (108) |
| 4. Other insulating materials[l] | – | – |
| D. SURFACES | | |
| 1. A surface upon which a unit may be placed or mounted in service, and surfaces that may be adjacent to the unit when it is so placed or mounted | 65 | (117) |
| 2. Any point on or within a terminal box or wiring compartment of permanently connected equipment in which power-supply conductors are to be connected, including such conductors themselves, unless the equipment is marked in accordance with 74.2. | 35 | (63) |

[a] This is the diameter, measured in the plane of the laminations of the circle circumscribing the stator frame, excluding lugs, boxes, and the like, used solely for motor mounting, assembly, or connection.

[b] At a point on the surface of a coil where the temperature is affected by an external source of heat, the temperature measured by means of a thermocouple may be 15°C (27°F) higher than that specified, provided that the temperature rise by the resistance method is not more than that specified.

[c] Insulation systems operating at a temperature greater than their limits shall comply with the thermal aging requirements for such insulation systems.

[d] A capacitor that operates at a temperature rise of more than 40°C (72°F) for electrolytic and more than 65°C (117°F) for other types may be evaluated on the basis of its marked temperature limit. However, the measured temperature shall not exceed the temperature rating of the capacitor based on a 25°C (77°F) ambient temperature.

[e] The temperature on a wiring terminal or lug is measured at the point most likely to be contacted by the insulation of a conductor installed as in actual service.

[f] If contacts of any metal and their supporting blades, busses, and connecting bars attain a temperature greater than 90°C (194°F) where a higher than nominal room ambient temperature or other external temperature prevails, or where affected by a bimetal heater or other heat source in the assembly, the control shall perform acceptably when subjected to overload and endurance tests conducted at the high temperatures involved.

*Exception: Contacts of silver or a silver alloy that do not attain a temperature higher than 100°C (212°F) need not be subjected to overload and endurance tests conducted at the higher temperature.*

[g] For a printed wiring board, the maximum temperature rise is the specified limit of the board minus an assumed ambient of 25°C (77°F).

[h] For a power-switching semiconductor and the like, the maximum temperature rise on the case is the maximum case temperature recommended by the semiconductor manufacturer minus an assumed ambient of 25°C (77°F) for open devices.

[i] These limitations do not apply to compounds and components that have been investigated and found for a higher temperature and determined to comply with the requirements.

[j] The maximum sealing-compound temperature, when corrected to a 25°C (77°F) ambient temperature, shall be 15°C (27°F) less than the softening point of the compound as determined in accordance with the Test for Softening Point by the Ball-and-Ring Apparatus, ASTM E28-82 .

[k] Rubber-insulated conductors within a motor having a Class A system, rubber-insulated motor leads, and a rubber-insulated flexible cord entering a motor may be subjected to a temperature rise of more than 35°C (63°F) if braid is used on each individual conductor. This does not apply to thermoplastic-insulated wires or cords.

[l] The compliance of insulating materials other than those covered in Table 42.1 is to be determined with regard to properties, such as flammability, arc-resistance, and the like, based on an operating temperature equal to the measured temperature rise plus 25°C (77°F).

42.2 To determine if the equipment complies with the temperature test requirements, it is to be operated under normal conditions and is to carry its rated current continuously at the test potential specified in Table 40.1 until temperatures are constant.

*Exception: The test on parts other than coils and transformer windings may be conducted at a potential between 90 and 110 percent of the potential specified if the ampere load is adjusted to produce the maximum normal heating.*

42.3 A protective device shall not trip during the temperature test.

42.4 Permanently-connected equipment is to be tested with 4 feet (1.22 m) of wire attached to each field-wiring terminal. The wire is to be of the smallest size having an ampacity of at least 125 percent of the test current for motor loads, continuous duty loads, and combination loads, and at least 100 percent for other loads. Wire size is to be determined in accordance with Table 310-16 of the National Electrical Code, ANSI/NFPA 70. The size is to be based upon wire that is rated for a temperature of 60°C (140°F) for a rating of 100 amperes or less, and upon wire that is rated for 75°C (167°F) for a rating greater than 100 amperes. The type of insulation is not specified.

42.5 Permanently-connected equipment is to be installed so that it is located as close to the wall or corner as the construction will permit. Cord-connected equipment is to be placed on a horizontal supporting surface and spaced 1 inch (25 mm) from a vertical wall surface of wood or comparable material, unless the arrangement of ventilation and similar cooling factors is such that operation against a wall, as compared with operation in the open, will not increase operating temperatures, or unless the construction of the equipment is such that a spacing greater than 1 inch is maintained. Doors and covers that may be closed during operation of the equipment are to be closed during the test.

42.6 All values in Table 42.1 are based on an assumed ambient temperature of 25°C (77°F), but a test may be conducted at any ambient temperature within the range of 10 – 40°C (50 – 104°F). However, if the operation of an automatic thermal control during the test limits the temperatures under observation, no temperature shall exceed 25°C plus the specified maximum rise.

42.7 A short length of rubber- or thermoplastic-insulated flexible cord exposed to a temperature higher than that for which it is rated, such as at terminals, may be used if supplementary heat-resistant insulation having the necessary dielectric strength is provided on the individual conductors of the cord to reduce the risk of deterioration of the conductor insulation.

42.8 Open-type equipment is to be tested in a 40°C (104°F) ambient, and temperature corrections as specified in 42.9 are to be made.

42.9 Equipment intended specifically for use with a prevailing ambient temperature constantly more than 25°C (77°F) is to be tested at such higher ambient temperature, and the allowable temperature rises specified in Table 42.1 are to be reduced by the amount of the difference between the higher ambient temperature and 25°C.

42.10 A low-potential supply source may be used for conducting temperature tests on parts other than coils or transformer windings. Unless otherwise noted, the tests on all parts are to be conducted simultaneously, as the heating of one part may affect the heating of another part. Equipment intended to be mounted to a duct or the like is to be mounted during the heating test so that actual service conditions will be approximated. The temperature of the test chamber is to be the highest temperature at which the equipment is intended to function.

42.11 If the equipment is obviously not intended for continuous operation, the heating test may be conducted so that probable intermittent or short-time operation is considered.

42.12 If stalling of a motor on a timer or the like is part of the normal operation of the equipment while connected to a supply circuit as specified in Table 40.1, the temperature rise shall not exceed the limits specified in Table 42.1 with the motor stalled.

42.13 If stalling of a motor as described in 42.12 is not part of the normal operation, the values specified in Table 42.1 do not apply; but the motor shall be provided with impedance, thermal, or overload protection that complies with requirements for the application.

42.14 Equipment provided with a fuseholder is to be tested with an unplated copper bar, unplated copper tubing, or an equivalent material with negligible impedance instead of a regular fuse.