46.4 When the non-fire alarm equipment is connected to the fire alarm system through separate wiring, opens and short circuits shall not impair the operation of the fire alarm system.

46.5 Ground faults which impede or impair the monitoring for integrity of the mass notification system or impede or impair any mass notification supervisory or trouble signal transmission or operation shall be reported at the mass notification system as trouble signals when they occur on the wiring interconnecting the mass notification equipment with non-fire alarm/non-emergency equipment.

46.6 When a mass notification system is intended to share components, equipment, circuitry, or installation wiring with non-fire and non-emergency equipment, and that equipment does not comply with either this standard or any of the standards shown in 46.2, the requirements of 46.7 – 46.9 shall apply.

Exception: With regard to the ground fault operation, where the interconnected equipment complies with the requirements contained in this standard, the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, or the Standard for General-Purpose Signaling Devices and Systems, UL 2017 and the ground condition is annunciated as a trouble condition at the LOC, ACU, or ECCU, as applicable, supervision of the mass notification circuits is permitted to be affected.

46.7 Short circuits or open circuits in the non-fire or non-emergency equipment or in the wiring between the non-fire/non-emergency equipment and the mass notification system shall not impede or impair the monitoring for integrity of the mass notification system as described in Common Performance and Monitoring for Integrity, Section 41, nor impede or impair any mass notification signal transmissions or operations.

46.8 Single ground faults in the non-fire alarm/non-emergency equipment shall not impede or impair the monitoring for integrity of the mass notification system, or impede or impair any mass notification supervisory or trouble signal transmissions or operation

46.9 The required operation of the mass notification equipment shall not be impaired by any failure of the non-fire alarm/non-emergency equipment hardware, software or circuits, or by any maintenance procedure, including removal or replacement of defective equipment or powering down of the non-fire/non-emergency equipment.

46.10 The monitoring for integrity as described in the Common Performance and Monitoring for Integrity, Section 41, shall continue to be met during the period the combination system is used for non-emergency purposes.

46.11 Emergency control or other non-fire functions shall not interfere with any required operation of the mass notification system.

46.12 In combination systems, mass notification signals shall be distinctive, clearly recognizable, and capable of taking precedence over any other signal even when a fire or non-fire alarm signal is initiated first.

46.13 Where the mass notification signaling unit is intended to be connected to a life safety network, the following shall apply:

a) The interconnecting path shall be monitored for integrity as described in the Common Performance and Monitoring for Integrity, Section 41.

Exception: Relays or appliances that provide fail-safe operation (activate, release, unlock) on loss of power or a fault or adverse condition on the interconnecting path that affects operation.

b) Non-mass notification alarm data transmitted to the mass notification system shall not impair the operation of the mass notification system.

46.14 Unless as indicated in 46.15 and 46.16, signal control and transport equipment (routers and servers) located in the critical mass notification signaling path of in-building mass notification communication links complying with Communications Security Level 1 (see 42.2.3) shall comply with this standard, the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, or the Standard for General-Purpose Signaling Devices and Systems, UL 2017.

46.15 Signal control and transport equipment, such as routers and servers complying with the Standard for Information Technology Equipment Safety – Part 1 – General Requirements, UL 60950-1, which do not modify the data package shall be permitted when the following is met:

a) All programming and configuration ensure a response time of 10 seconds.

b) Communication link system bandwidth is monitored to confirm all communications between equipment that is critical to the operation of the mass notification system take place within 10 seconds and failure is indicated within 200 seconds. In lieu of monitoring bandwidth, polling such that a trouble is annunciated when the communication exceeds 10 seconds meets the intent of this requirement.

c) Failure of any equipment that is critical to the operation of the mass notification system is indicated at the local operator console and the autonomous control unit and emergency communications control unit, if applicable, within 200 seconds.

46.16 In conjunction with 46.15, the installation instructions shall stipulate the signal control and transport equipment meet the following:

a) The equipment is provided with primary and secondary power and monitored for integrity as required by section 10.5 of the National Fire Alarm Code, NFPA 72.

b) The equipment provided is rated for the voltage and temperature and humidity variation required by section 10.14.1 of the National Fire Alarm Code, NFPA 72.

c) A barrier gateway attached to or connected to each local operating console (LOC), autonomous control unit (ACU), or emergency communications control unit (ECCU), and complying with the requirements contained in this standard, the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, or the Standard for General-Purpose Signaling Devices and Systems, UL 2017, shall be provided to prevent the other systems from interfering with or controlling the mass notification system.

PERFORMANCE – OTHER TESTS

47 General

47.1 Products that meet the requirements of UL 60950-1 or UL 60065 are not required to be evaluated to the following Sections: 50, 52, 60, 62, 63, 64, 65.4, 65.6, 65.7, 66, 67, and 72.1.

48 Power Input/Output Characteristics Tests

48.1 The power input to an amplifier shall not exceed 110 percent of the marked rating while delivering rated output power to the specified load or a resistive load of equivalent magnitude.

48.2 An amplifier shall deliver rated output power and voltage to a rated load when a sinusoidal signal of minimum rated input voltage and having a frequency of 1 kilohertz is applied to the input circuit of the amplifier while the amplifier is connected to a source of rated voltage.

48.3 An amplifier shall deliver not less than 60 nor more than 120 percent of rated output power (80 –110 percent of rated output voltage) over an 800 – 2800 hertz bandwidth. The input signal is to be at rated voltage and is to be constant over the range of signal frequencies, as established at a test signal frequency of 1 kilohertz.

48.4 If the manufacturer specifies a bandwidth for the product that includes frequencies lower than 800 or higher than 2800 hertz, the product shall comply with the requirement of 48.3 over these additional frequency ranges.

48.5 For these tests, all operator-accessible gain controls are to be adjusted to impose worst case (maximum distortion) operating conditions on the system with regard to output (power) to the load.

49 Harmonic Distortion Test

49.1 Crossover

49.1.1 The crossover distortion of an amplifier rated for speech power shall not be greater than 7 percent, when measured at 1/10 power points (10 decibels down from rated power output) at a signal frequency of 1000 hertz. Measurements of crossover distortion are to be made over the rated frequency range of the amplifier.

49.1.2 During the measurement of crossover distortion, the amplifier is to be tested using a sine wave input and while delivering to a rated load consisting of speakers or any combination of speakers and simulated resistive loading of equivalent impedance.

49.2 Total Harmonic

49.2.1 If an upper frequency cutoff is not specified, the total harmonic distortion of an amplifier shall not exceed 20 percent in the frequency range of 800 – 2800 hertz while delivering full rated load and operating as specified in 49.1.2.

49.2.2 If the specified upper frequency cutoff is greater than 2800 hertz, the total harmonic distortion of an amplifier shall not exceed 20 percent in the frequency range of 800 – 2800 hertz. In the range of 2800 – 15000 hertz, the total harmonic distortion at any frequency (f) shall not exceed the value determined by the formula: Percent Total Harmonic Distortion = 20e[–0.000189 (f-2800)].

49.2.3 During the measurements of total harmonic distortion specified in 49.2.1 and 49.2.2, a minimum of ten measurements are to be made within the appropriate frequency range with the amplifier adjusted to deliver maximum rated output and 10 decibels below the maximum rated output.

50 Electrical Ratings Test

50.1 General

50.1.1 A low-voltage circuit of a product shall comply with the limits specified in 5.13.

50.2 Power input circuits

50.2.1 With the product energized from rated voltage and connected to maximum rated load, the input current of the product shall not exceed the marked rating of the product when the product is operated under all conditions of intended use.

50.2.2 Where the operating voltage of a product is specified at two or more discrete values, the requirement in 50.2.1 shall be applied at each voltage rating.

50.2.3 Where the input to the product is specified as a DC voltage range, the input current rating shall be a single value that is equal to or greater than the measured input current obtained at any voltage within the range.

50.3 Other external circuits

50.3.1 All external circuits shall be electrically rated to permit proper installation of the product using wiring methods permitted by the National Electrical Code, ANSI/NFPA 70. The actual measured values of any circuit shall not exceed the rating for that circuit.

50.3.2 The electrical rating of a circuit shall indicate the maximum circuit voltage under any operating condition including an open circuit and the maximum circuit current (or wattage for an audio product) under any condition of normal operation.

50.3.3 Where the circuit is not power limited as defined in the Class 2 and Class 3 Circuits Test, Section 52, and a circuit fault condition will cause a circuit current in excess of the normal current rating, either:

a) The maximum fault current shall be indicated or

b) The minimum size wire capable of handling the fault current shall be indicated.

There shall be coordination between the maximum fault current and the overcurrent or current limiting protection required in 15.4.

51 Variable Voltage Operation Test

51.1 The product, when connected to maximum rated load as described in 31.2.2 and subjected to the input voltage conditions described in 51.2 – 51.4, shall operate as intended and without risk of fire or electric shock during all conditions of intended use. At each input voltage, all conditions of intended use are to be maintained until constant temperatures of its parts are reached, or a minimum of two hours.

51.2 The product is to be subjected to the following variable voltage conditions:

a) 110 percent of the rated primary input voltage specified in Table 31.1. The secondary power source is to be connected to rated voltage.

b) 110 percent of the marked rated nominal standby battery voltage or rated secondary power input voltage specified in Table 31.1. The primary input voltage is to be disconnected.

c) 85 percent of rated primary input voltage specified in Table 31.1 or at some lower level of transfer voltage as specified in 39.2.1 and 39.2.3. The standby battery or, when provided, a secondary power source shall be disconnected.

d) 85 percent of the marked rated nominal standby battery voltage or rated secondary power input voltage specified in Table 31.1. The primary input voltage is to be disconnected.

51.3 In conducting the reduced voltage test, the voltage is to be reduced by a means that will maintain a stable potential of the required value under the most severe conditions of normal loading.

51.4 The reduced voltage tests are to be made with the maximum line impedance as indicated in the installation wiring diagram connected to all external circuit(s).

51.5 The increased voltage tests are to be made with zero line impedance in each external circuit.

51.6 In those cases where different components or units of a combination system obtain power from separate sources, each source is to be independently varied while the system is tested for its normal operation.

51.7 A product intended to be used with a standby battery shall have sufficient capacity to maintain a charged battery under all conditions of intended operation, including sufficient capacity to operate the product with the battery disconnected or fully discharged. In any operating mode other than when the product is in the alarm condition, the battery charger shall be capable of maintaining the battery in the charged condition when the product input is at a maximum of 85 percent of rated voltage or at some lower level of transfer voltage as determined according to 39.2.1 – 39.2.5.

51.8 A charged battery is defined as a battery having the capacity to maintain the product in the normal supervisory and alarm conditions for the time period required in the Charging Current Test, Section 55.

51.9 An amplifier shall deliver not less than 60 percent nor more than 170 percent of its rated output power (80 – 130 percent of rated output voltage) when the power-supply input voltage is varied as specified in 51.2. The 1 kilohertz signal described in 48.2 is not to be adjusted.

51.10 When the power-supply input voltage is established at 85 percent and 110 percent of the rated voltage, the 1 kilohertz signal described in 48.2 is to be varied, as needed, so that the rated output voltage is delivered to the load. The amplifier shall comply with the requirement of the Harmonic Distortion Test, Section 49, as specified in 51.2.

52 Class 2 and Class 3 Circuits Test

52.1 General

52.1.1 All field-wiring circuits that derive energy from power sources connected to a control unit shall be classified as Class 2 or 3 or non-energy-limited circuit. A circuit shall be considered non-energy-limited unless otherwise identified in the installation documentation and marking on the product.

52.1.2 The power source (or sources) supplying a Class 2 or 3 circuit shall be either inherently limited requiring no overcurrent protection, or limited by a combination of a power source and overcurrent protection devices such that a Class 2 or 3 circuit has electrical characteristics as described in Table 52.1 for AC circuits or Table 52.2 for DC circuits.

Table 52.1
Power source limitations for alternating-current, Class 2 and Class 3 circuits

Circuit		Inherently limited power source (overcurrent protection not required)				Not inherently limited power source (overcurrent protection required)			
		Class 2			Class 3	Class 2		Class 3	
Circuit voltage V_{max} (volts)[a]		0 – 20	over 20 – 30	over 30 – 150	over 30 – 100	0 – 20	over 20 – 30	over 30 – 100	over 100 – 150
Power limitations $(VA)_{max}$ (volt-amps)[a]		–	–	–	–	250[b]	250	250	NA
Current limitations I_{max} (amps)[a]		8.0	8.0	0.005	$150/V_{max}$	$1000/V_{max}$	$1000/V_{max}$	$1000/V_{max}$	1.0
Maximum overcurrent protection (amps)		–	–	–	–	5.0	$100/V_{max}$	$100/V_{max}$	1.0
Power source maximum nameplate ratings	VA (volt-amps)	$5.0 \times V_{max}$	100	$0.005 \times V_{max}$	100	$5.0 \times V_{max}$	100	100	100
	Current (amps)	5.0	$100/V_{max}$	0.005	$100/V_{max}$	5.0	$100/V_{max}$	$100/V_{max}$	$100/V_{max}$
Voltage ranges shown are for sinusoidal AC in indoor locations or where wet contact is not probable. For non-sinusoidal or wet contact conditions, see note c.									

[a] V_{max}: Maximum output voltage regardless of load with rated input applied.

I_{max}: Maximum output current under any noncapacitive load, including short-circuit, and with overcurrent protection bypassed, when used. When a transformer limits the output current, I_{max} limits apply after one minute of operation. Where a current-limiting impedance, listed for the purpose, or as part of a listed product, is used in combination with a nonpower-limited transformer or a stored energy source, e.g., storage battery, to limit the output current, I_{max} limits apply after 5 seconds.

VA_{max}: Maximum volt-ampere output after one minute of operation regardless of load and overcurrent protection bypassed, when used. Current-limiting impedance shall not be bypassed when determining I_{max} and VA_{max}.

[b] When the power source is a transformer, VA_{max} is 350 or less where V_{max} is 15 or less.

[c] For non-sinusoidal AC, V_{max} shall not be greater than 42.4 volts peak. Where wet contact (immersion not included) is probable, Class 3 wiring methods shall be used, or V_{max} shall not be greater than 15 volts for sinusoidal AC and 21.2 volts peak for non-sinusoidal AC.

Table 52.2
Power source limitations for direct-current, Class 2 and Class 3 circuits

Circuit		Inherently limited power source[a] (overcurrent protection not required)					Not inherently limited power source (overcurrent protection required)			
		Class 2				Class 3	Class 2		Class 3	
Circuit voltage V_{max} (volts)[b]		0 – 20	over 20 – 30	over 30 – 60	over 60 – 150	over 60 – 100	0 – 20	over 20 – 60	over 60 – 100	over 100 – 150
Power limitations $(VA)_{max}$ (volt-amps)[b]		–	–	–	–	–	250[c]	250	250	NA
Current limitations I_{max} (amps)[b]		8.0	8.0	150/ V_{max}	0.005	150/V_{max}	1000/ V_{max}	1000/ V_{max}	1000/ V_{max}	1.0
Maximum overcurrent protection (amps)		–	–	–	–	–	5.0	100/ V_{max}	100/ V_{max}	1.0
Power source maximum nameplate ratings	VA (volt-amps)	5.0 x V_{max}	100	100	0.005 x V_{max}	100	5.0 x V_{max}	100	100	100
	Current (amps)	5.0	100/ V_{max}	100/ V_{max}	0.005	100/ V_{max}	5.0	100/ V_{max}	100/ V_{max}	100/ V_{max}
Voltage ranges shown are for continuous DC in indoor locations or where wet contact is not probable. For interrupted DC or wet-contact conditions, see note d.										

[a] A dry-cell battery shall be considered an inherently limited power source, provided the voltage is 30 volts or less and the capacity is equal to or less than that available from series connected No. 6 carbon zinc cells.

[b] V_{max}: Maximum output voltage regardless of load with rated input applied.

I_{max}: Maximum output current under any noncapacitive load, including short-circuit, and with overcurrent protection bypassed, when used. When a transformer limits the output current, I_{max} limits apply after 1 minute of operation. Where a current-limiting impedance, listed for the purpose or as part of a listed product, is used in combination with a nonpower-limited transformer or stored energy source, e.g., storage battery, to limit the output current, I_{max} limits apply after 5 seconds.

VA_{max}: Maximum volt-ampere output after one minute of operation regardless of load and overcurrent protection bypassed, when used. Current-limited impedance shall not be bypassed when determining I_{max} and VA_{max}.

[c] When the power source is a transformer, $(VA)_{max}$ is 350 or less where V_{max} is 15 or less.

[d] For DC interrupted at a rate of 120 to 20 Hz, V_{max} shall not be greater than 24.8 volts. Where wet contact (immersion not included) is probable, Class 3 wiring methods shall be used, or V_{max} shall not be greater than 30 volts for continuous DC and 12.4 volts for DC that is interrupted at a rate of 10 to 200 Hz.

52.1.3 Relative to 52.1.2, acceptable means for current limiting include:

a) Transformer winding impedance,

b) Thermal link embedded within the winding overwrap of a transformer,

c) Circuit components (resistors, regulators, transistors, and similar devices) which comply with the temperature test under I_{max} condition, and

d) Suitable current-limiting impedances (positive temperature coefficient varistor, and the like).

52.1.4 Relative to 52.1.2, the following are not acceptable means of current-limiting:

a) Circuit component burnout;

b) Permanent or replaceable fuses;

c) Opening of conductors on printed-wiring boards; and

d) Opening of internal wiring conductors.

52.1.5 The overcurrent protection device specified in 52.1.2 shall be of the non-interchangeable type such that it cannot be renewed in the field with an overcurrent device having a higher current rating.

52.1.6 When conducting I_{max} and VA_{max} measurements, all overcurrent protection devices of the control unit are to be short-circuited. However, current-limiting devices are not to be bypassed and are to be allowed to remain functional.

52.1.7 Where the product contains a float battery charger, V_{max}, I_{max}, and VA_{max} measurements are to be conducted with both AC and battery connected to the product. If the product contains a battery transfer relay or contains a trickle charge battery circuit, measurements of V_{max}, I_{max}, and VA_{max} are to be conducted with the product first energized only from the AC power source and then repeated with the product energized solely from the battery. The battery used during these measurements is to have the largest capacity as specified in the manufacturer's installation document.

52.1.8 The loads referenced in 52.2.1 – 52.4.1 shall be resistive.

52.2 Maximum voltage

52.2.1 With the product energized only from its rated primary power source, the output voltage of the circuit under test is to be measured while the circuit is connected to full rated load and under open circuit conditions. The maximum voltage recorded under these two conditions is to be considered V_{max}. Where the product incorporates a secondary source of supply, the test is to be repeated with the product energized solely from the secondary power source and with the primary power source disconnected. The V_{max} value obtained from each power source is to be considered separately when applying the requirements of Table 52.1 or 52.2.

52.3 Maximum current

52.3.1 In order to determine compliance with the I_{max} limitation, a variable load resistor initially set to draw rated current is to be connected across the circuit. The current through the load resistor is to be noted and the load removed. The resistance of the load shall then be incrementally decreased, momentarily reconnected across the circuit while noting the current, and then removed. The method is to be repeated until a short-circuit condition is obtained. The load resistor is then to be readjusted to a value capable of producing and maintaining a current equal to the maximum permitted in Tables 52.1 and 52.2. The load resistor is then to be connected to the circuit and the current through the load resistor measured after 1 minute or after 5 seconds as determined from Table 52.1 or 52.2.

52.3.2 The maximum current measurement is to be the rms value for circuits that are constantly energized and the peak value for circuits that pulse the output. The measurement of the time period starts when the output is initially energized with the load specified in 52.3.1, and continues until the current is continuously below the I_{max} value indicated in Table 52.1 or 52.2. The time period is to include any momentary period where the output current temporarily drops below the required I_{max} value limit.

52.3.3 Where a transformer limits the value of I_{max}, and when I_{max} cannot be maintained for 1 minute due to transformer burnout, a plot of current versus time is to be generated and the graph extrapolated to 1 minute. The results satisfy the requirement of the test when the extrapolated value of I_{max} at 1 minute does not exceed the I_{max} limitations as indicated in Tables 52.1 or 52.2.

52.3.4 Where a transformer does not limit the current of I_{max}, and when the maximum current through the load resistor cannot be maintained for 5 seconds due to current-limiting devices (opening of thermal link power supply foldback, PTC varistor effect, and similar devices) the current load resistor shall be adjusted to a value which will produce a current just above the I_{max} value indicated in Table 52.1 or 52.2. The results are in compliance when the I_{max} value stated in Table 52.1 or 52.2 cannot be maintained for more than 5 seconds.

52.4 VA_{max} (not inherently limited circuits only)

52.4.1 In order to determine VA_{max}, the product is to be energized from a rated source of supply and the circuit under test open-circuited. A variable load resistor, initially set to draw rated circuit current, is then to be connected across the circuit, the circuit voltage and current recorded, and the load removed. The resistance of the load is then to be incrementally decreased, momentarily reconnected across the circuit while recording the voltage and current, and then removed. This procedure is to be repeated until the load resistance has been reduced to a short circuit. Using the recorded voltage and current, the volt-ampere output under each load condition is to be calculated. The load resistor is then to be adjusted to that value which produced the maximum volt-ampere calculated and then connected to the circuit. After 1 minute, the voltage and current are again to be measured. The results of this test are acceptable if the calculated volt-ampere output of the circuit after 1 minute does not exceed the value specified in Table 52.1 or 52.2, as appropriate.

53 Compatibility Tests

53.1 General

53.1.1 The interconnection of the product with other devices shall be evaluated for the purpose of operating as a coordinated system relative to the intended signaling and without risk of fire, electric shock, or injury to persons.

53.1.2 The requirements in 53.1.1 apply to products connected to or providing circuits described in 53.2.1.1 – 53.5.2.3, and by which the operating parts of the product are actuated for signaling and/or action.

53.2 Notification appliance circuits (NAC)

53.2.1 Rating

53.2.1.1 All notification appliance circuits of a product shall be identified by at least one of the rating designations shown in Table 53.1.

Exception: Output circuits intended to be connected to speakers shall comply with the output parameters specified in Sections 48, Power Input/Output Characteristics, and 51, Variable Voltage Operation Test.

53.2.1.2 NAC circuits that employ integral signaling schemes, or that connect to separate devices (e.g. synchronization modules) employing signaling schemes, to synchronize, to activate and deactivate subsets of the appliances on a NAC, or to change the output (e.g. color or tone) of appliances, shall be evaluated as special applications when assembled in a system with those devices/appliances. This does not preclude these circuits from also being evaluated and marked as regulated circuits when used with other devices/appliances that do not require these signaling schemes.

53.2.1.3 Providing multiple ratings on a NAC is permissible as long as one of the ratings is a regulated rating to meet the requirements of 33.14.

Table 53.1
Voltage types and ratings

Rating designation	Voltage type	Maximum RMS voltage range limits
Regulated 12 DC	DC	8 – 17.5
Regulated 24 DC	DC	16 – 33
Regulated 12 FWR	FWR	8 – 17.5
Regulated 24 FWR	FWR	16 – 33
Regulated 120 AC	AC	96 – 132
Regulated 240 AC	AC	192 – 264
Special application	Any	Rated

53.2.2 Voltage measurement test

53.2.2.1 While the product is energized at the voltage extremes described in the Variable Voltage Operation Test, Section 51, the voltage of the circuit shall be maintained within the voltage range limits shown in Table 53.1, under the load conditions indicated in Table 53.2 for circuits rated “regulated”, and Table 53.3 for circuits rated “special application”.

Exception: Products with notification appliance circuits intended for connection to a synchronized repetitive pulsing load are not required to be subjected to Condition 4 in Table 53.2 and Condition 3B in Table 53.3.

Table 53.2
Regulated NAC circuits

Condition	Magnitude	Duration	Frequency	Required circuit voltage
1 (non-pulsing load)	Minimum circuit rating	Continuous	Continuous	Rated RMS value
2 (non-pulsing load)	Maximum circuit rating	Continuous	Continuous	Rated RMS value
3 (synchronized repetitive pulsing load)	Impedance load equal to 5 times the maximum circuit rating	16.7 milliseconds	2 hertz	Rated RMS value during individual application of surge impedance

Table 53.2 Continued on Next Page

Table 53.2 Continued

Condition	Magnitude	Duration	Frequency	Required circuit voltage
4 (non-synchronized repetitive pulsing load)	Impedance load equal to the maximum circuit rating plus the greater of the following currents: a) A value equal to 1.5 times the maximum single notification appliance operating RMS current rating specified to be connected to the circuit. b) A value equal to 4 times the maximum single notification appliance operating RMS current rating specified for connection to the circuit where the maximum number of appliances exceed 30.	Continuous	Continuous	Rated RMS value

Table 53.3
Special application NAC circuits

Condition	Magnitude	Duration	Frequency	Required circuit voltage
1 (non-pulsing load)	Minimum circuit rating	Continuous	Continuous	Rated RMS value
2 (non-pulsing load)	Maximum circuit rating	Continuous	Continuous	Rated RMS value
3A (synchronized repetitive pulsing load)	Impedance load equal to the maximum peak of the repetitive surge current of the notification appliance multiplied by the specified maximum number of corresponding notification appliance to be used on the circuit.	See note (1)	2 hertz	Rated RMS value during individual application of surge impedance
3B (non-synchronized repetitive pulsing load)	Impedance load equal to the maximum circuit rating plus the greater of the following currents: a) A value equal to 1.5 times the maximum single notification appliance operating RMS current rating specified to be connected to the circuit. b) A value equal to 4 times the maximum single notification appliance operating RMS current rating specified for connection to the circuit where the maximum number of appliances exceed 30.	Continuous	Continuous	Rated RMS value

Table 53.3 Continued on Next Page