

**Underwriters Laboratories Inc.®**

An independent, not-for-profit organization testing for public safety

July 6, 1993**Revision pages for****Standard for****Holdup Alarm Units and Systems****UL 636, Ninth Edition**

Attached to this transmittal notice is a reprinted title page for the ninth edition of UL 636.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 636-1992.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the Department of Defense approved text of UL 636.

Revised and/or additional pages may be issued from time to time.

With the inclusion of the accompanying material, the standard consists of pages dated as shown in the following checklist:

Page	Date
1	July 30, 1987 (Reprinted July 6, 1993)
2	May 29, 1991
2A, 2B	July 15, 1991
3	May 29, 1991
4	July 30, 1987
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18, 18A	May 29, 1991
19	July 30, 1987
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21 — 25	July 30, 1987
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27 — 37	July 30, 1987
38	July 31, 1987
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UL 636

Standard for

Holdup Alarm Units and Systems

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Third Edition — November, 1952	Seventh Edition — August, 1978
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Ninth Edition

July 30, 1987

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An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

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The Department of Defense (DoD) has approved the ninth edition of UL 636 on April 9, 1992, including revision pages through and including July 15, 1987. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the DoD approved text.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest published set of revision pages.

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July 15, 1991**Revision pages for****STANDARD FOR****HOLDUP ALARM UNITS AND SYSTEMS****UL 636, NINTH EDITION**

Attached to this transmittal notice is a revision of the ninth edition of UL 636.

A CHANGE IS INDICATED BY A VERTICAL LINE IN THE MARGIN ON PAGES DATED JULY 15, 1991.

THESE NEW AND REVISED REQUIREMENTS ARE NOW IN EFFECT.

The new and revised requirements are substantially in accordance with UL's bulletin on this subject dated February 19, 1991. The bulletin is now obsolete and may be discarded.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 636-1987.

Revised and/or additional pages may be issued from time to time.

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SHORT RANGE RADIO FREQUENCY (RF) OPERATED INITIATING DEVICES

55. General

Section 55 deleted July 15, 1991

55A. General

55A.1 These requirements cover the operation of control units and systems that utilize initiating, annunciating, and remote control devices that provide signaling by means of low power radio frequency (RF) in accordance with the Code of Federal Regulations (CFR) 47, Part 15. Such control units and systems shall comply with Sections 1 — 54 of this standard except that in the event of conflict, the requirements of this section shall apply. An initiating device may be a fixed device or may be a portable device intended to be used by persons required to move about the premises.

Paragraph 55A.1 added July 15, 1991

55A.2 These requirements are applicable (1) to a system configuration consisting of multiple transmitters and a single receiver with the transmitters operating on a random basis, and (2) with modifications, to a system employing such configurations as multiple receivers or a two-way interrogate response system.

Paragraph 55A.2 added July 15, 1991

55A.3 Initiating circuit transmitters that are powered by a nonrechargeable (primary) battery shall serve only one holdup initiating device and shall be individually identified at the receiver/control unit.

Exception: A maximum of five holdup initiating devices may be served by one transmitter if the transmitter and the devices are located in the same room.

Paragraph 55A.3 added July 15, 1991

55A.4 A repeater is a transceiver (transmitter/receiver) that is used to receive transmissions from transmitters and relay the signals to the receiver/control unit. A repeater shall comply with all of the requirements that apply to a transmitter.

Paragraph 55A.4 added July 15, 1991

55B. Time to Report Alarm

55B.1 The transmitter/receiver combination shall be arranged so that the occurrence of an alarm or emergency condition at any transmitter will be immediately communicated to the receiver/control unit and processed as required. Under unusual or abnormal operating conditions (such as clash or interference), this signal may be delayed for a period not exceeding 90 seconds.

Paragraph 55B.1 added July 15, 1991

†Additional page

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55B.2 A signal from an RF initiating device shall latch at the receiver/control unit until manually reset and shall identify the particular RF initiating device in alarm.

Exception: Check-in signals required by Inoperative Transmitter Reporting, Section 55C, are not required to latch and identify.

Paragraph 55B.2 added July 15, 1991

55B.3 To provide higher priority to alarm and emergency signals than to other signals, such signals shall be either continuous or periodically repeated at intervals not exceeding 60 seconds until the initiating device is returned to its normal condition. If the signal is continuous, the transmitter shall be limited to a maximum 15 percent duty cycle measured over a 1-minute interval.

Exception: If the transmitter is manually activated, the 15 percent duty cycle limitation is not applicable.

Paragraph 55B.3 added July 15, 1991

55C. Inoperative Transmitter Reporting

55C.1 A receiver/control unit shall report and identify an inoperative transmitter in the system within 4 hours after the transmitter becomes inoperative. The report indication shall include an audible trouble signal.

Exception: A transmitter intended to be carried on one's person need not comply with this requirement.

Paragraph 55C.1 added July 15, 1991

55C.2 The normal periodic transmission from a wireless initiating device shall, by transmitting at a reduced power level of at least 3 decibels or by other means, provide additional assurance of successful alarm transmission capability.

Paragraph 55C.2 added July 15, 1991

55C.3 The requirements of paragraph 55C.2 are met through compliance with Sections 55J, 55L, 55M, and 55O.

Paragraph 55C.3 added July 15, 1991

55D. Battery Status Indication

55D.1 A transmitter shall supervise the capacity of the battery. The battery shall be monitored while loaded by (1) transmission of the transmitter, or (2) a load equivalent to the load imposed by transmission.

Paragraph 55D.1 added July 15, 1991

55D.2 A trouble status signal shall be transmitted to the receiver before the battery capacity of the transmitter has depleted to a level insufficient to power the unit for at least 7 days. The trouble signal shall be retransmitted at intervals not exceeding 4 hours until the battery is replaced or is depleted.

Paragraph 55D.2 added July 15, 1991

55D.3 The battery (of the transmitter) shall be capable of operating the transmitter, including the initiating device (if powered by the same battery), for not less than 1 year of normal signaling service before the battery depletion threshold specified in paragraph 55D.2 is reached.

Paragraph 55D.3 added July 15, 1991

55D.4 Annunciation of low battery trouble at the receiver/control unit shall be distinctly different from alarm, supervisory, tamper, and initiating device trouble signals. It shall consist of an audible and visual signal which shall identify the affected transmitter.

Paragraph 55D.4 added July 15, 1991

55D.5 The battery trouble status signal may be transmitted at the normal supervisory status report time of the transmitter. The audible annunciation of a battery trouble signal at the receiver/control unit may be delayed for a maximum period of 4 hours.

Paragraph 55D.5 added July 15, 1991

55D.6 The audible signal of the receiver may be silenceable if provided with an automatic feature to reinstated the signal at intervals not exceeding 4 hours.

Paragraph 55D.6 added July 15, 1991

55D.7 The trouble status signal shall persist at the receiver/control unit until the depleted battery has been replaced.

Paragraph 55D.7 added July 15, 1991

†Additional page

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55D.8 Any mode of failure of a nonrechargeable (primary) battery in an initiating device transmitter shall not affect any other initiating device transmitter.

Paragraph 55D.8 added July 15, 1991

55E. Tamper Protection

55E.1 Removal of a permanently mounted transmitter from its installed location or the removal of a cover exposing its battery shall cause immediate transmission of a signal to the receiver/control unit that will, in turn, result in an audible and visual trouble signal individually identifying the affected device when the system is in the disarmed condition. When the system is in the armed condition, an alarm shall also be initiated. The audible signal of the receiver may be silenceable if provided with an automatic feature to reinstate the signal at intervals not exceeding 4 hours.

Paragraph 55E.1 added July 15, 1991

55F. Interference Protection

55F.1 Reception of any unwanted (interfering) transmission by a repeater, or by the receiver/control unit for a continuous period of 20 seconds or more, that would inhibit any status change signaling within the system, shall result in an audible and visual trouble signal indication at the receiver/control unit when the system is in the disarmed condition. This indication shall identify the specific trouble condition (interfering signal) as well as the device(s) affected (repeated and/or receiver/control unit). When the system is in the armed condition, an alarm shall also be indicated.

Paragraph 55F.1 added July 15, 1991

55G. Reference Level Determination

Method I

55G.1 The reference level test is not intended to determine the actual service communication

range of a transmitter/receiver combination. Rather, this data is utilized as a reference level for the testing specified in Sections 55H — 55O. The range determined during the ideal conditions of this test shall not be considered representative of the actual range within a building structure, which will probably be significantly less.

Paragraph 55G.1 added July 15, 1991

55G.2 A transmitter/receiver combination shall operate for its intended signaling performance when tested in a configuration at minimum signal strength, measured at the receiver, as specified in the manufacturer's installation instructions. The tests are to be conducted in an open, flat area characteristic of cleared, level terrain. Such test sites are to be (1) void of buildings, electrical lines, fences, trees, or the like, (2) free from underground cables, pipes, lines, or the like, except as required to supply and operate the equipment under test, and (3) free of snow and water accumulations. The ambient radio noise level and other undesired signals are to be sufficiently low (see Methods Of Measurement Of Radio-Noise Emissions From Low-Voltage Electrical And Electric Equipment In The Range Of 10 kHz to 1 GHz, ANSI C63.4-1988) so as not to interfere with the measurements. Any large reflecting object, such as a metal fence or the like, is to be sufficiently far from the test site so as not to influence the test results. See Figure 55G.1.

Exception: In lieu of the condition of (2), a ground plane may be used. The ground plane shall cover the area required to be free of reflecting objects shown in Figure 55G.1, or more. The ground plane shall be constructed of wire mesh with 1/4 to 1/2 inch openings or the equivalent.

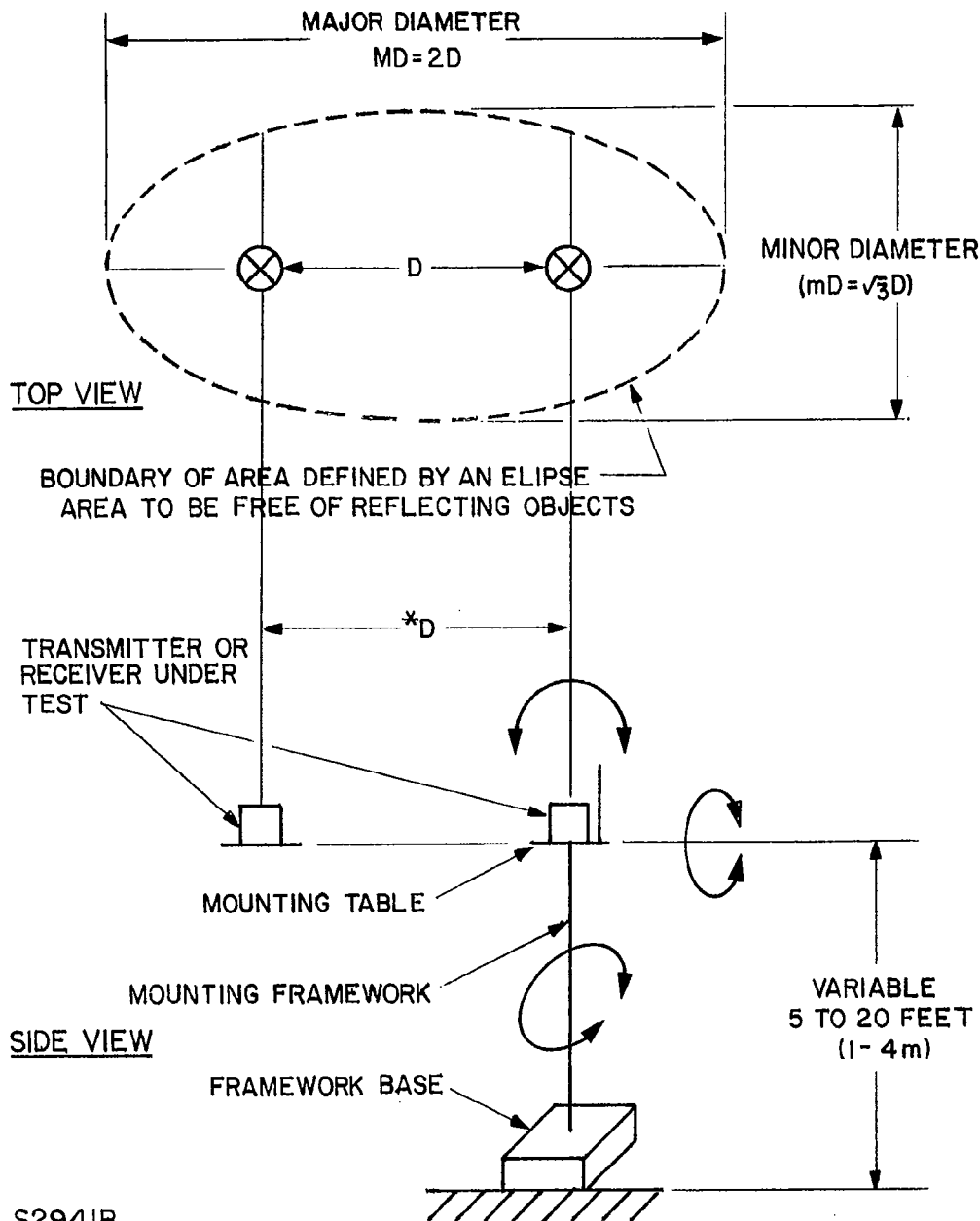
Paragraph 55G.2 added July 15, 1991

†Additional page

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FIGURE 55G.1

TEST SITE AND EQUIPMENT ARRANGEMENT



D = For Method 1, manufacturer's maximum specified range, not less than 10 feet (3.05 m). Test site to comply with paragraph 55G.2 within area defined by boundary in top view. If Method 2 is used, $D = 3$ m (9.84 feet).

NOTE: Signal strength is measured at receiver.

Figure 55G.1 added July 15, 1991

†Additional page

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55G.3 The equipment under test is to be positioned as intended in use on a wooden or other nonconducting table and framework that will permit the transmitter and receiver to be relatively oriented for worst-case communication. The mounting of the table on the framework is to be arranged so that the table surface can be adjusted to elevations of 5, 10, and 20 feet (1.5, 3, and 6 m). The number of elevations and relative positions may be reduced if the manufacturer's installation instructions provide specific limitations relating to orientation, as well as a method of testing as specified in paragraph 55G.4.

Paragraph 55G.3 added July 15, 1991

55G.4 Worst-case communication is that relative orientation between transmitter and receiver that results in the minimum field strength specified by the manufacturer, measured at the receiver by the appropriate installation aids and test equipment designated for that purpose.

Paragraph 55G.4 added July 15, 1991

55G.5 The equipment and procedures specified in the installation instructions are to be used to establish test installation of the RF system.

Paragraph 55G.5 added July 15, 1991

55G.6 A sample transmitter with fresh batteries and a sample receiver are to be placed on similar tables, as specified in paragraph 55G.3, resulting in a separation at the maximum range specified for the transmitter/receiver combination.

Paragraph 55G.6 added July 15, 1991

55G.7 A transmitter is to be remotely activated by a nonconductive mechanism that will not increase the effective radiating or receiving size of the antenna.

Paragraph 55G.7 added July 15, 1991

55G.8 The transmitter or receiver is to be rotated through a 90-degree angle in each of the three orthogonal axes with either the transmitter or receiver fixed in position, and the level of the received signal is to be observed for worst-case communication. The test is to be conducted at the 5-, 10-, and 20-foot (1.5-, 3-, and 6-m) elevations or as otherwise specified in paragraph 55G.3.

Paragraph 55G.8 added July 15, 1991

55G.9. The test is to be repeated with batteries depleted to the trouble level as specified in paragraphs 55D.1 — 55D.4. For the purpose of this requirement, a depleted battery is defined as a battery that is at the level (terminal voltage under load) that results in a trouble signal as required in paragraphs 55D.1 — 55D.4. For test purposes, a depleted battery may be replaced by a circuit arrangement that does not affect the RF characteristic (± 6 decibels as measured at the receiver), but does simulate the characteristics of a depleted battery as specified in paragraph 55D.2.

Paragraph 55G.9 added July 15, 1991

Method 2

55G.10 This test may be alternately conducted in a 3-m (9.84-foot) site as described in (1) Recommended Methods of Measurement of Radiated and Conducted Interference From Receivers for Amplitude-Modulation, Frequency Modulation, and Television Broadcast Transmissions, IEC Standard Publication 106-1974 or (2) Methods Of Measurement Of Radio-Noise Emissions From Low-Voltage Electrical And Electronic Equipment In The Range Of 10 kHz To 1 GHz, ANSI C63.4-1988. If Method 2 is used, the test methodology described in paragraphs 55G.1 — 55G.9 is to be followed except that the attenuation factors for receiver/transmitter specified in Figure 55G.2 are to be utilized as scaling factors.

Paragraph 55G.10 added July 15, 1991

†Additional page

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FIGURE 55G.2

SIGNAL ATTENUATION CURVES

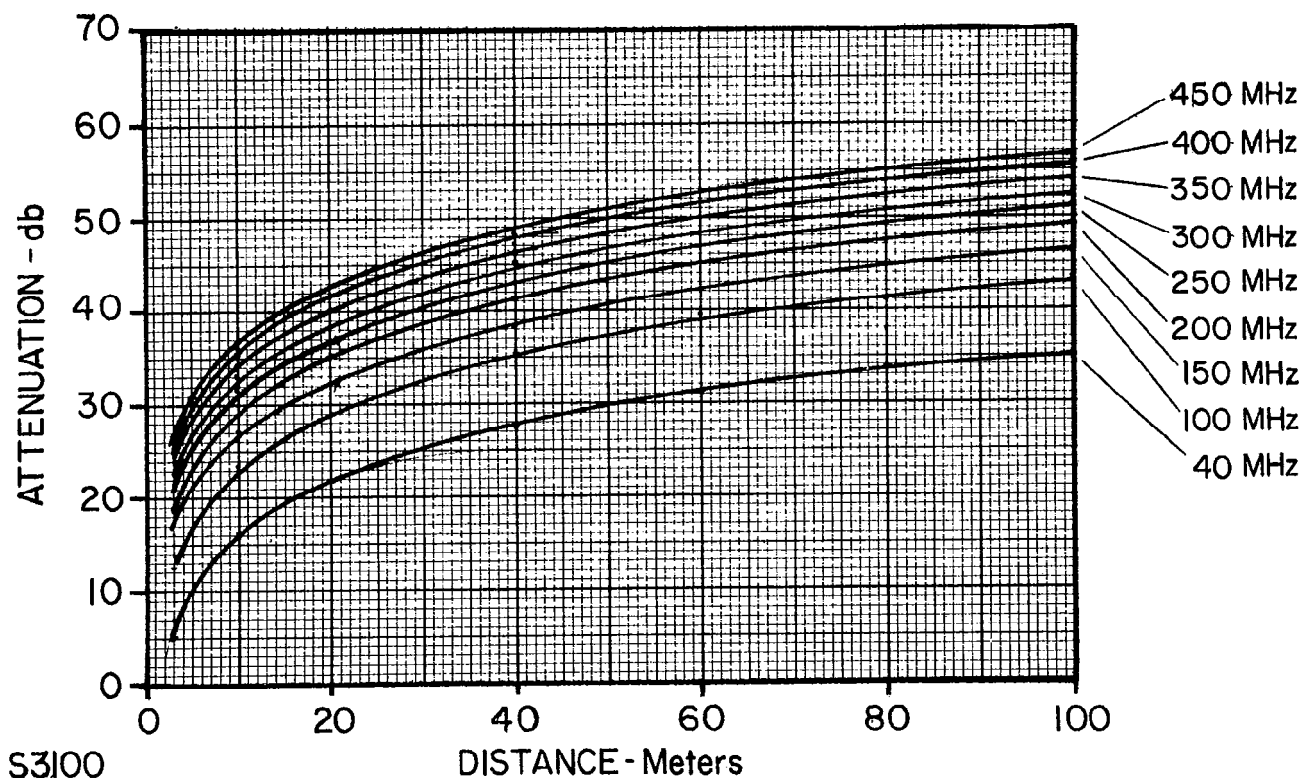


Figure 55G.2 added July 15, 1991

55G.11 Paragraphs 55G.12 — 55G.14 specify details in applying Method 2.

Paragraph 55G.11 added July 15, 1991

55G.12 Attenuation is to be determined from the equation:

$$A = 20 \log_{10} D + 20 \log_{10} F_m - 36.6$$

where:

A = Attenuation in decibels.

D = Manufacturer's specified range.

F_m = Operating frequency in megahertz.

36.6 = The derived numerical value assuming that ground reflection is 4.7 dB average.

Paragraph 55G.12 added July 15, 1991

55G.13 The attenuation factor for a reference signal at 3 m (9.84 feet) is to be determined from the equation:

$$A_C = A_D - A_{3M}$$

where:

A_C = Attenuation factor.

A_D = Attenuation at manufacturer's specified range.

A_{3M} = Attenuation at 3-meter distance.

Table 55G.1 specifies the attenuation factors, A_D , for absolute attenuation at the manufacturer's specified range and the attenuation relative to the 3-meter test distance, A_C .

Paragraph 55G.13 added July 15, 1991

†Additional page

TABLE 55G.1
SIGNAL ATTENUATION VALUES

Distance, Meters	Frequency									
	40 MHz	100 MHz	150 MHz	200 MHz	250 MHz	300 MHz	350 MHz	400 MHz	450 MHz	
	A_D									
	A_C									
3	4.98	12.94	16.46	18.96	20.90	22.48	23.82	24.98	26.01	—
10	15.44	23.04	26.92	29.42	31.35	32.94	34.28	35.44	36.46	10.46
15	18.96	26.94	30.44	32.94	34.88	36.46	37.80	38.96	39.99	13.98
20	21.46	29.42	32.94	35.44	37.37	38.96	40.30	41.46	42.48	16.48
25	23.40	31.35	34.88	37.37	39.31	40.90	42.24	43.40	44.42	18.42
30	24.98	32.94	36.46	38.96	40.90	42.48	43.82	44.98	46.01	20.00
35	26.32	34.28	37.80	40.30	42.24	43.82	45.16	46.32	47.35	21.34
40	27.48	35.44	38.96	41.46	43.40	44.98	46.32	47.48	48.50	22.50
45	28.50	36.46	39.97	42.48	44.42	46.01	47.35	48.50	49.53	23.52
50	29.42	37.38	40.90	43.40	45.34	46.92	48.26	49.42	50.44	24.44
55	30.25	38.20	41.73	44.22	46.17	47.75	49.09	50.24	51.27	25.27
60	31.00	38.96	42.48	44.99	46.92	48.50	49.84	51.00	52.03	26.02
65	31.70	39.66	43.18	45.68	47.62	49.20	50.54	51.70	52.72	26.72
70	32.34	40.30	43.82	46.32	48.26	49.84	51.18	52.34	53.37	27.36
75	32.94	40.90	44.42	46.92	48.86	50.44	51.78	52.94	53.96	27.96
80	33.50	41.46	44.98	47.48	49.42	50.00	52.34	53.50	54.53	28.52
85	34.03	41.99	45.51	48.00	49.95	51.53	52.87	54.03	55.05	29.05
90	34.53	42.48	46.01	48.50	50.44	52.03	53.36	54.53	55.54	29.54
95	35.00	42.95	46.48	48.97	50.91	52.50	53.84	55.00	56.02	30.01
100	35.44	43.40	46.92	49.42	51.36	52.94	54.28	55.44	56.46	30.46

Table 55G.1 added July 15, 1991

55G.14 Figure 55G.2 depicts attenuation curves for signals at 40, 100, 150, 200, 250, 300, 350, 400, and 450 megahertz. The attenuation adheres to a slope of 20 decibels per decade at a given frequency.

Paragraph 55G.14 added July 15, 1991

55G.15 The reference level is the measured signal level at 3 meters minus A_C .

Paragraph 55G.15 added July 15, 1991

55H. Interference Immunity

55H.1 A receiver/transmitter combination at maximum range shall operate for its intended signaling performance in both a "Radio Quite" and a "Radio Noisy" environment. See paragraphs 55H.2 and 55H.3. Also see Error (Falsing) Rate, Section 55L, and Throughput Rate, Section 55M.

Paragraph 55H.1 added July 15, 1991

55H.2 For the purpose of this requirement, a "Radio Quiet" environment is one in which the interference signal magnitude level is at least 20 decibels peak below the desired signal as determined by paragraph 55G.4 within the frequency band of the signal, as measured at the receiver.

Paragraph 55H.2 added July 15, 1991

55H.3 For the purpose of this requirement, a "Radio Noisy" environment is one in which the interference signal level is 10 — 20 decibels peak below the desired signal as determined by paragraph 55G.4, as measured at the receiver. This condition is intended to test the receiver's ability to discriminate the desired signal from background noise under worst-case conditions.

Paragraph 55H.3 added July 15, 1991

†Additional page

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55H.4 A "Radio Noisy" environment is to be created by each of the sources specified in items A, B, and C, connected to modulate the amplitude of an RF oscillator at 100 percent. The signal strength is to be measured at the receiver with a spectrum analyzer or other acceptable instrument to determine that the signal intensity is within the parameters defined for a "Noisy" environment. The interference is to emanate from a tuned 1/2 wave dipole antenna, capable of 360 degrees rotation in order to vary the polarization.

A. A white noise generator^a modulating an RF signal generator^b in which the frequency is varied ± 5 percent about the signaling frequency.

B. Variable frequency audio oscillator^c varied between 20 hertz to 40 kilohertz, modulating an RF signal generator in which the frequency is varied ± 5 percent about the (1) carrier frequency, (2) image frequency, if applicable, and (3) intermediate frequency (IF), if applicable.

C. A square wave generator^d varied between 20 hertz to 40 kilohertz, modulating an RF signal generator in which the frequency is varied ± 5 percent about the (1) carrier frequency, (2) image frequency, if applicable, and (3) intermediate frequency (IF), if applicable.

^aGeneral Radio Model 1382 rated 20 — 50 kilohertz or the equivalent.

^bHewlett Packard Model 8640B with frequency doubler option or the equivalent.

^cHewlett Packard Model 654A signal generator modulating the RF signal generator (or the equivalent) or may utilize the variable audio oscillator option.

^dSquare wave generator to modulate the RF signaling generator. The output impedance of the square wave generator shall match the input impedance of the RF signal generator.

Paragraph 55H.4 added July 15, 1991

55H.5 Each of the interference signals specified in paragraph 55H.4 shall not cause false alarming; however, they may cause a jamming or a loss of transmitter indication. Operation of the receiver/transmitter combination shall comply with the requirements for the Error (Falsing) Rate and Throughput Rate, Sections 55L and 55M.

Paragraph 55H.5 added July 15, 1991

55I. Frequency Selectivity

55I.1 If a product utilizes multiple frequencies, a receiver shall not respond to any signal (1) having a signal strength equivalent to the most powerful system transmitter located at a distance of 32.8 feet (10 m) from the receiver and (2) having a frequency shifted more than two working channel widths of the system, as measured between the manufacturer's rated upper and lower frequency limits of the receiver/transmitter combination. For example, if the communication channel is 5 megahertz wide, any signal with a similar band width, even one with identical coding, the center frequency of which is shifted by more than 10 megahertz, shall be ignored by the receiver.

Paragraph 55I.1 added July 15, 1991

55I.2 A receiver is to be connected to a source of rated supply and is to be positioned for intended use in a "Radio Quiet" environment.

Paragraph 55I.2 added July 15, 1991

55I.3 A sample transmitter that is adjusted for receiver-acceptable information is to be tuned to a center frequency that is shifted from the receiver's tuned center frequency by twice the band width of the transmitter/receiver combination. The transmitter then is to be repeatedly activated as specified in paragraph 55I.1, and the receiver shall not provide an output to any signal transmitted.

Paragraph 55I.3 added July 15, 1991

55I.4 This test is to be conducted for frequencies above and below the receiver frequency, including a minimum of ten additional frequencies randomly selected about the center frequency (0.5 MHz — 1.024 GHz) and outside the frequency as specified in paragraph 55I.1.

Paragraph 55I.4 added July 15, 1991

†Additional page

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55I.5 The test is to be monitored by a spectrum analyzer or other acceptable instrument to verify transmitter output.

Paragraph 55I.5 added July 15, 1991

55I.6 For test purposes, if the operating frequency or signal level, or the like, of a transmitter cannot be varied, the transmitter may be partially replaced by an RF signal generator or the entire transmitter assembly may be replaced by a combination of a programmable processor and an RF signal generator. The processor is to produce the base band signal which modulates the RF signal generator output, provided that similar signal levels are generated at the receiver.

Paragraph 55I.6 added July 15, 1991

55J. Clash

55J.1 For the purpose of these requirements, clash is a loss of alarm signal information at the receiver for a period greater than 90 seconds as a result of two or more transmitters being concurrently activated when only one is in an alarm mode so that their transmitted signals interfere with each other.

Paragraph 55J.1 added July 15, 1991

55J.2 The calculated clash rate for any given system is a derivative of the (1) maximum number of transmitters (transmitters for neighboring systems are not to be considered), (2) duration of individual transmission, (3) transmission rate, (4) coding scheme, (5) error (falsing) rate, and (6) prioritization. When determining this rate for each type of signal noted in items A — D in paragraph 55J.3, each specified factor is to be considered in the evaluation. The manufacturer shall provide a derivation of the rate. This derivation shall provide an explicit definition of the requirements for clash and shall describe all the assumptions and equations used in the derivation of the clash rate.

Paragraph 55J.2 added July 15, 1991

55J.3 The clash rate relative to normal status transmissions for each specific signal shall not exceed the following values:

- A. 0.0001, for fire signals.
- B. 0.0002, for medical or panic signals.
- C. 0.0005, for security signals.
- D. 0.005, for other signals, not including the check-in signals required to comply with Inoperative Transmitter Report, Section 55C.

Paragraph 55J.3 added July 15, 1991

55J.4 If an alarm signal and another signal, alarm or otherwise, are transmitted at precisely the same time, the signal received at the receiver shall (1) be correct for one of the two, or both, or (2) shall not be accepted by the receiver as a correct signal.

Paragraph 55J.4 added July 15, 1991

55K. Clash Error

55K.1 A receiver shall demonstrate a zero clash error rate while subjected to the test conditions described in paragraphs 55K.3 — 55K.5.

Paragraph 55K.1 added July 15, 1991

55K.2 For the purpose of these requirements, clash error is defined as the misinterpretation by the receiver of two simultaneous or overlapping valid transmitter signals that result in the receiver locking-in and annunciating a third (false) signal.

Paragraph 55K.2 added July 15, 1991

55K.3 The receiver is to be mounted in a position of intended use and energized from a source of rated supply. Two transmitters, energized from a rated source of a supply or from a dc power supply in place in their nonrechargeable (primary) batteries, are to be placed in close proximity to the receiver and orientated such that the manufacturer's specified signal strength is present at the receiver. The address of each transmitter is to be set such that the logical "or" of the two addresses is a valid address recognized by the receiver.

Paragraph 55K.3 added July 15, 1991

†Additional page

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55K.4 One transmitter is to then be conditioned for continuous alarm transmission. The other transmitter shall be conditioned to transmit an alarm signal once every 2 seconds for a total of 100,000 transmissions.

Paragraph 55K.4 added July 15, 1991

55K.5 The test described in paragraphs 55K.3 and 55K.4 is to be repeated while one transmitter is conditioned for continuous alarm transmission and the other transmitter is conditioned to transmit a normal supervisory status signal once every 2 seconds for a total of 100,000 transmissions.

Paragraph 55K.5 added July 15, 1991

55L. Error (Falsing) Rate

55L.1 For the purpose of these requirements, the error (falsing) rate is a measure of the ability of a receiver to discriminate between correct and incorrect transmission so that false or erroneous signals are not accepted by the receiver as valid status indications from the various transmitters in the system. The transmitter/receiver shall comply with the following:

A. The communication between each transmitter and receiver shall involve a unique message for each signal status.

B. The communication message shall include information uniquely identifying each transmitter.

C. The communication message components that identify the individual transmitter shall permit a minimum of 256 unique combinations. For larger systems, the number of combinations shall be increased so that the number of combinations available to the system is numerically equivalent to eight times the maximum number of transmitters that may be used within the system. For example, if 50 transmitters are used, the system's capability shall provide a minimum of 400 unique combinations.

Paragraph 55L.1 added July 15, 1991

55L.2 As a measure of compliance with paragraph 55L.1, the error (falsing) rate of the receiver shall be determined by utilizing the test procedure described for reference level determination, see paragraphs 55G.1 — 55G.9 except for the following:

A. Batteries depleted to the trouble signal level are to be installed in the transmitter. See paragraph 55G.9 for depleted battery simulation.

B. The transmitter is to be physically oriented for "worst-case" signaling as determined during reference level determination. See paragraph 55G.8.

C. A counter is to be connected to the transmitter to record the number of transmissions. The arrangement is not to interfere with the transmitter output.

D. The transmitter is to be conditioned for continuous transmissions (1) 1,000,000 messages with one element incorrect, then (2) 1,000,000 messages with two elements incorrect, and finally (3) 1,000,000 messages with three elements incorrect. See paragraph 55I.6 for alternate transmitter configurations.

E. A counter is to be connected to the receiver that will record the number of incorrect messages accepted as valid messages by the receiver.

F. The test is to be continued until a minimum of 1,000,000 messages are completed for each of the three conditions of incorrect transmission, except that if zero incorrect messages are accepted as valid after the first 100,000 messages, the test at that number of incorrect elements per message and any higher number of incorrect elements per message need not be conducted.

G. The test shall comply with the specifications in Table 55L.1.

Paragraph 55L.2 added July 15, 1991

†Additional page

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TABLE 55L.1
ERROR (FALSING) RATE TEST

Number of Incorrect Elements Per Message	Messages Completed	Maximum Number of Incorrect Messages Accepted As Valid
1	100,000 1,000,000	1 2
2	100,000 1,000,000	0 1
3	100,000 1,000,000	0 0

Added Table 55L.1 added July 15, 1991

55L.3 The test is to be conducted in both a "radio quiet" and "radio noisy" environment as described in Interference Immunity, Section 55H.

Paragraph 55L.3 added July 15, 1991

55M. Throughput Rate

55M.1 For the purpose of these requirements, the throughput rate is a measure of the ability of a receiver to accurately interpret and execute upon receipt of a correct signal in order to achieve a high degree of assurance that alarm or emergency signals are not lost. The transmitter/receiver combination shall be structured so that alarm or emergency signals take precedence over all other signals. The prioritization may be achieved by (1) extending the duration of the signal, (2) repeating the alarm or emergency signal, or (3) any other means that can be demonstrated to be equivalent. If multiple services are utilized on the same system, the priority levels of signals shall be:

- A. Fire alarm
- B. Medical or panic alarm
- C. Security alarm
- D. Trouble and supervisory signals
- E. Other

Paragraph 55M.1 added July 15, 1991

55M.2 The throughput rate of the receiver is to be determined by utilizing the test procedure described for the error (falsing) rate, paragraphs 55L.2 and 55L.3, except that only correct signals of each type are to be transmitted. The test results shall comply with Table 55M.1. The test may be conducted for 100,000 cycles rather than 1,000,000 if the test results comply with the 100,000 signals completed row in Table 55M.1.

Paragraph 55M.2 added July 15, 1991

†Additional page

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TABLE 55M.1
THROUGHPUT RATE TEST

Type of Signal	Signals Completed	Maximum Number of Signals in Test Conditions:	
		Radio Quiet	Radio Noisy ^b
Fire	100,000 ^a	4	24
	1,000,000	50	250
Medical or Panic	100,000 ^a	9	48
	1,000,000	100	500
Security	100,000 ^a	19	97
	1,000,000	200	1000
Other	100,000 ^a	38	195
	1,000,000	400	2000

^aSee paragraph 55M.2.

^bSee paragraph 55M.3.

Table 55M.1 added July 15, 1991

55M.3 If the test results in the "Radio Noisy" environment comply with those corresponding missed signal specifications for the "Radio Quiet" environment in Table 55M.1, the latter tests are waived and the unit is considered to comply with the requirements specified for "Radio Quiet".

Paragraph 55M.3 added July 15, 1991

55N. Transmitter Stability Test

55N.1 The intended performance of a transmitter shall not be degraded nor shall the output signal frequency vary beyond the rated receiver input frequency while the transmitter and receiver (and repeater if used) are exposed and tested under the following environmental conditions:

- A. 0°C (32°F) for 3 hours.
- B. 49°C (120°F) for 3 hours.

C. 85 ± 5 percent relative humidity at 30 ± 2°C (86 ± 2°F) for 24 hours.

Paragraph 55N.1 added July 15, 1991

55O. Transmitter Accelerated Aging Test

55O.1 A transmitter shall operate for its intended signaling performance as specified in paragraph 55N.1 after being exposed for 30 days to an ambient temperature of 70°C (158°F), followed by a stabilization period of 24 hours in an ambient temperature of 23°C (73.4°F). During the test, the unit is to be powered from either a separate power supply adjusted to the rated nominal battery voltage, or the battery if it is capable of maintaining nominal voltage for the test duration.

Paragraph 55O.1 added July 15, 1991

†Additional page

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55P. Installation Instructions and User Manual

55P.1 The installation instructions and user manual shall include at least the following:

- A. Specific and detailed installation limitations for RF equipment, such as building construction, possible effect of metallic bodies that may not be visible, specification of procedures, installation aids, and test equipment (by manufacturer and model number or the equivalent) needed to install the system as intended, and specific receiver-to-transmitter orientations;
- B. The maximum separation (range) of the equipment, including indication that the manufacturer's specified range is for comparative purposes only and may be significantly reduced when the equipment is installed in a typical installation;
- C. Instructions to test the system for operation upon completion of installation; and
- D. Instructions to replace transmitter batteries yearly.

Paragraph 55P.1 added July 15, 1991

†Additional page

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56. Test

56.1 A radio frequency operated initiating device shall provide a method of testing the operating ability of each device to initiate a holdup alarm. The performance of the test shall not cause a holdup alarm to be transmitted to the remote station.

57. Range

Section 57 deleted July 15, 1991

58. Drop Test

58.1 A sample of a radio frequency operated initiating device is to be dropped four times from a height of 3 feet (0.9 m) onto a hardwood floor. If it has corners, it is to be dropped on a different corner each time, the four corners that appear to be most susceptible to damage being selected. If the device has no corners, it is to be dropped on a different part each time, the four portions that appear to be most susceptible being selected.

58.2 The device is to be inspected following the test to determine that each electrical spacing has not been reduced below the limit specified in (Spacings) General, Section 21.

58.3 The device shall be operative and its range shall not decrease more than 25 percent from that determined in the Reference Level Determination, Section 55G, following the completion of this test.

Paragraph 58.3 revised July 15, 1991

MANUFACTURING AND PRODUCTION TESTS

59. General

59.1 The manufacturer shall provide the necessary production control, inspection, and tests. The program shall include at least the tests specified in Production Line Dielectric Voltage-Withstand Test for High-Voltage Products, Section 60, and Production Line Grounding Continuity Test for High-Voltage Cord-Connected Products, Section 61. A record of accepted holdup alarm units and the unit serial number or equivalent shall be maintained.

60. Production Line Dielectric Voltage-Withstand Test for High-Voltage Products

60.1 Each unit rated at more than 30 volts ac rms (42.4 volts dc or ac peak) shall withstand, without breakdown, as a routine production-line test, the application of an essentially sinusoidal ac potential of a frequency within the range of 40—70 hertz, or a dc potential, between (1) high-voltage live parts and the enclosure, (2) high-voltage live parts and exposed dead metal parts, and (3) live parts of circuits operating at different potentials or frequencies. The test potential is to be:

A. For a unit rated at 250 volts ac rms or less — either 1000 volts (1414 volts, if a dc potential is used) applied for 60 seconds or 1200 volts (1697 volts, if a dc potential is used) applied for 1 second.

**Replaces page 45 dated July 30 1987*

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B. For a unit rated at more than 250 volts — either 1000 volts plus twice the rated ac rms voltage (1414 volts plus 2.828 times the rated ac rms voltage, if a dc potential is used) applied for 60 seconds or 120 volts plus 2.4 times the rated voltage (1697 volts plus 3.394 times the rated ac rms voltage, if a dc potential is used) applied for 1 second.

60.2 If the product uses high-voltage and low-voltage circuits, the test is to be conducted with the low-voltage circuit connected to the cabinet, chassis, or other dead metal parts so that the potential that is applied between the high-voltage live parts and dead metal parts will simultaneously be applied between high-voltage live parts and low-voltage circuits.

60.3 A printed wiring assembly or other electronic circuit component that would be damaged by the application of, or would short-circuit, the test potential, is to be removed, disconnected, or otherwise rendered inoperative before the test. A representative subassembly may be tested instead of an entire unit. Rectifier diodes in the power supply may be individually shunted before the test to avoid destroying them in the case of a malfunction elsewhere in the secondary circuits.

60.4 If the charging current through a capacitor or capacitor type filter connected across the line, or from line to earth ground, is sufficient to prevent maintenance of the specified ac test potential, the unit is to be tested using a dc test potential in accordance with paragraph 60.1.

60.5 A 500 VA or larger transformer, the output voltage of which can be varied, is to be used to determine compliance with the requirement specified in paragraph 60.1. The requirement for a 500 VA or larger transformer can be waived if the high potential testing equipment maintains the specified voltage at the unit during the test.

60.6 The test equipment is to include a visible indication of application of the test potential and an audible or visible indication, or both, of breakdown. In the event of breakdown, manual reset of an external switch is required, or an automatic reject of the product under test is to result. Other arrangements may be accepted if found to achieve the results contemplated.

61. Production Line Grounding Continuity Test for High-Voltage Cord-Connected Products

61.1 The manufacturer shall test each cord-connected high-voltage holdup alarm unit which has a power-supply cord terminating in an attachment plug using a grounding pin to verify electrical continuity between the product and the grounding blade of the attachment plug.

61.2 For this test, the manufacturer is to use a resistance-indicating instrument with leads and terminals by which the grounding circuit continuity may be determined.

61.3 If an investigation of the product has shown all exposed dead metal parts that are likely to become energized and all dead metal parts within the enclosure that are exposed to contact during servicing to be acceptably bonded to the frame and enclosure of the product, a test to verify electrical continuity between the grounding blade and the frame or enclosure is considered to be sufficient.

MARKING

62. General

62.1 A holdup alarm unit shall be permanently marked at a location that is visible after installation, with the following information:

A. Manufacturer's or private labeler's name or identifying symbol.

B. Date of manufacture by week, month, or quarter and year (any of which may be abbreviated or in an established or otherwise traceable code).

C. Model number or equivalent.

D. Electrical ratings:

1. AC Powered Units — Rated voltage; amperes, watts, or VA; and frequency.

2. Battery Powered Units — Rated voltage; type and number of batteries to be used.

E. Intended mounting position if a product is intended to be mounted in a definite position.



Underwriters Laboratories Inc.®

An independent, not-for-profit organization testing for public safety

May 29, 1991

Revision pages for

STANDARD FOR

HOLDUP ALARM UNITS AND SYSTEMS

UL 636, NINTH EDITION

Attached to this transmittal notice is a revision of the ninth edition of UL 636.

A CHANGE IS INDICATED BY A VERTICAL LINE IN THE MARGIN ON PAGES DATED MAY 29, 1991.

THESE REQUIREMENTS ARE NOW IN EFFECT.

The requirements are substantially in accordance with UL's bulletins on this subject dated September 1, 1989, March 16, 1990, and October 8, 1990. These bulletins are now obsolete and may be discarded.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 636-1987.

Revised and/or additional pages may be issued from time to time.

With the inclusion of the accompanying material, the standard consists of pages dated as shown in the following checklist:

Page	Date
1	July 30, 1987
2, 2A, 3	May 29, 1991
4	July 30, 1987
5, 6, 6A	May 29, 1991
7 — 17	July 30, 1987
18, 18A	May 29, 1991
19	July 30, 1987
20	May 29, 1991
21 — 25	July 30, 1987
26, 26A	May 23, 1988
27 — 37	July 30, 1987
38	July 31, 1987
39	July 30, 1987
40	July 31, 1987
41 — 50	July 30, 1987
50A, 51, 52	May 29, 1991
53, 54	July 30, 1987
A1, A2	May 23, 1988

(16)



Documents

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July 30, 1987

1

ANSI/UL 636—1987

UL 636
**STANDARD FOR
HOLDUP ALARM UNITS AND SYSTEMS**

First Edition — July, 1933
 Second Edition — June, 1945
 Third Edition — November, 1952
 Fourth Edition — February, 1958
 Fifth Edition — September, 1972
 Sixth Edition — July, 1973
 Seventh Edition — August, 1978
 Eighth Edition — July, 1980

NINTH EDITION

July 30, 1987

Approval as an American National Standard covers the numbered paragraphs on pages dated July 30, 1987. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the approved text. Revisions of this standard will be made by issuing revised or additional pages bearing their dates of issue.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Approved as ANSI/UL 636—1978, June 16, 1978
 Approved as ANSI/UL 636—1982, May 11, 1982
 Approved as ANSI/UL 636—1987, January 23, 1987

(1—7/30/87)

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1. Scope

1.1 These requirements cover holdup alarm systems of the remote-station type intended for installation in banks, stores, cashiers' cages, pay offices, and the like to provide a means of transmitting a silent call for help in the event of interior robbery. These systems are divided into the three classes listed in paragraph 1.2 and are defined under Extent of Protection, Section 73.

1.2 The three classes are: Bandit-Resisting Enclosure and Alarm, Semiautomatic Alarm, and Manual Alarm.

1.3 A product that contains features, characteristics, components, materials, or systems new or different from those in use when the standard was developed, and that involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements as determined necessary to maintain the level of safety for the user of the product as originally anticipated by the intent of this standard.

Paragraph 1.3 added May 29, 1991

2. General

Terminology

2.1 The term "product" as used in this standard refers to all types of holdup alarm units.

2.2 Unless otherwise indicated, all voltage and current values mentioned in this standard are rms.

Units of Measurement

2.3 If a value for measurement is followed by another value in other units, in parentheses, the second value may be only approximate. The first stated value is the requirement.

Components

2.4 Except as indicated in paragraph 2.4A, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

2.4A A component need not comply with a specific requirement that:

A. Involves a feature or characteristic not needed in the application of the component in the product covered by this standard, or

B. Is superseded by a requirement in this standard.

Paragraph 2.4A added July 31, 1987

2.4B A component shall be used in accordance with its recognized rating established for the intended conditions of use.

Paragraph 2.4B added July 31, 1987

2.4C Specific components are recognized as being incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions for which they have been recognized.

Paragraph 2.4C added July 31, 1987

Undated References

2.5 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

**Replaces page 5 dated July 31, 1987*

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3. Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 **ALARM INITIATING DEVICE** — A switch operated by hand or foot, by key, by removal of currency bills, or by other means to initiate a holdup alarm signal.

3.3 CIRCUITS, ELECTRICAL:

A. **HIGH-VOLTAGE** — A circuit involving a potential of not more than 600 volts and having circuit characteristics in excess of those of a low-voltage power limited circuit.

B. **LOW-VOLTAGE** — A circuit involving a potential of not more than 30 volts ac, rms, 42.4 volts dc or ac peak.

C. **POWER LIMITED** — A circuit whose output is limited as specified in Tables 3.1 and 3.2. The power limitation shall be provided by the construction of the transformer, a fixed impedance, a noninterchangeable fuse, a nonadjustable manual reset circuit protective device, or a regulating network.

3.4 **LINE-VOLTAGE** — The voltage at any field-connected source of supply nominally 50—60 Hz; 115, 208, or 230 volts.

3.5 **NORMAL STANDBY CONDITION** — The ready-to-operate condition existing prior to tripping or operation of the product.

3.6 **PRIMARY BATTERY** — Any battery which by design or construction is not intended to be recharged.

TABLE 3.1^a

POWER LIMITATIONS FOR INHERENTLY LIMITED POWER SOURCE (OVERCURRENT PROTECTION NOT REQUIRED)

Circuit Voltage V_{max}^b AC-DC (Volts)	Maximum Nameplate Ratings		Current Limitation I_{max}^c (Amperes)
	VA (Volt Amperes)	Current (Amperes)	
0 to 20	$5.0 \times V_{max}^b$	5.0	8.0
over 20 to 30	100	$100/V_{max}^b$	8.0
over 30 to 100	100	$100/V_{max}^b$	$150/V_{max}^b$
over 100 to 250 DC only	$0.030 \times V_{max}^b$	0.030	0.030

^a Reproduced in part from the National Electrical Code (NFPA 70), 1990 Edition, copyright National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

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

^c I_{max} : Maximum output after 1 minute of operation under any noncapacitive load, including short circuit.

Table 3.1 revised May 29, 1991

**Replaces page 6 dated July 30, 1987*

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TABLE 3.2^aPOWER LIMITATIONS FOR POWER SOURCES NOT INHERENTLY LIMITED
(OVERCURRENT PROTECTION REQUIRED)

Circuit Voltage $V_{\max}^b$ AC-DC (Volts)	Maximum Nameplate Ratings		Current Limitation $I_{\max}^c$ (Amperes)	Power Limitation (VA) $_{\max}^d$ (Volt Amperes)	Maximum Overcurrent Protection (Amperes)
	VA (Volt Amperes)	Current (Amperes)			
0 to 20	$5.0 \times V_{\max}^b$	5.0	$1000/V_{\max}^b$	250 ^e	5.0
over 20 to 100	100	$100/V_{\max}^b$	$1000/V_{\max}^b$	250 ^e	$100/V_{\max}^b$
over 100 to 150	100	$100/V_{\max}^b$	1.0	NA	1.0

^aReproduced in part from the National Electrical Code (NFPA 70), 1990 Edition, copyright National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

^b $V_{\max}$: Maximum output voltage regardless of load with rated input applied.

^c $I_{\max}$: Maximum output after 1 minute of operation under any noncapacitive load, including short circuit, and with overcurrent protection bypassed.

^d(VA) $_{\max}$: Maximum volt-ampere output regardless of load with overcurrent protection bypassed.

^eIf the power source is a transformer (VA) $_{\max}$ is 350 or less when $V_{\max}$ is 15 or less.

Table 3.2 revised May 29, 1991

3.7 RADIO FREQUENCY — Electromagnetic radiation generally greater than 20 kHz.

3.8 SAFETY CIRCUIT — Any primary or secondary circuit that is relied upon to reduce the risk of fire, electric shock, or injury to persons (for example, an interlock).

3.9 SECONDARY BATTERY — Any battery which by construction is intended to be recharged.

**Replaces page 6A dated July 31, 1987*

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