UL 1971

STANDARD FOR SAFETY

Signaling Devices for the Hearing Impaired

UL Standard for Safety for Signaling Devices for the Hearing Impaired, UL 1971

Third Edition, Dated November 29, 2002

SUMMARY OF TOPICS

This revision to ANSI/UL 1971 includes Revision to the Signal Strength and Format Test to Address LED Strobes.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated June 1, 2018.

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UL 1971

Standard for Signaling Devices for the Hearing Impaired

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Third Edition

November 29, 2002

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through August 29, 2018.

The most recent designation of ANSI/UL 1971 as a Reaffirmed American National Standard (ANS) occurred on August 29, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover emergency-signaling devices for the hearing impaired. The devices and/or systems covered by this standard are suitable for use in a controlled environment, or in an uncontrolled environment as indicated in the product marking. These devices are to be used in accordance with the requirements of the National Fire Alarm Code, NFPA 72.

1.2 A signaling device as covered by these requirements consists of a unit assembly of electrical parts having provision for the connection of power supply circuits routed through the equipment by a prescribed scheme of circuiting. Also included are circuits that extend to separate devices by which additional units are actuated for signals. An installation wiring diagram attached to the product, or referenced in the product marking, indicates the devices and circuits that are acceptable for connection to the signaling device.

1.3 These requirements are to evaluate visible signaling appliances for public mode operation. These appliances are designed to alert occupants or inhabitants within the protected area. These requirements do not cover lights intended for private mode fire alarm signaling, lights intended for non-fire-alarm signaling applications, manual boxes, automatic fire detectors, or other initiating devices; nor do they cover bells, registers, or other indicating devices not provided as part of the product.

1.4 Deleted

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, 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 used in the products covered by this standard.

2.1.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

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

2.1.4 Specific components are 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.

2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.3 Undated references

2.3.1 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.

3 Glossary

3.1 For the purpose of this standard the following definitions apply. Additionally, the terms “visual” and “visible” are considered equivalent in meaning throughout the Standard.

3.2 CANDELA – For the purpose of this Standard, the light output of a flashing light is measured with an integration radiometer and the summation of light intensity over time (Idt) is used in the following equation to determine the effective light intensity. The candela (Cd) value assigned to a flashing light is calculated and corresponds to the same value of candela of a fixed light operating under identical conditions of observation, color, size, and shape:

$$Cd = (Idt) / (0.2 + t_2 - t_1)$$

in which:

Idt is the measured lumens recorded by the photometer over time for ten consecutive pulses;

0.2 is two-tenths of one second, the value which represents nighttime threshold effective illumination as specified in the Illuminating Engineering Society Handbook, 5th Edition; and

$t_2 - t_1$ represents the time period of the light pulse.

3.3 CONTROLLED ENVIRONMENT – An area where ambient temperatures, humidity, and exposure to water (rain) are controlled or limited. For the purpose of this standard, the limits noted in these requirements identify the controlled environment for the interior of a typical building that uses heating and/or air cooling systems.

3.4 CRITICAL ANGLE – The five-degree (5°) dispersion angle that has the lowest ratio of measured light output to minimum required light output for all five-degree increments within the plane of measurement. This angle is identified by comparison of all ratios of measurements obtained within the plane during the Signal Strength and Format Test, Section 27. All ratios of measured light to required minimum light shall be equal to or greater than 1. For example:

Ratio = Measured light/Minimum required light

15 Cd / 12 Cd

5/4 = 1.25

3.5 INITIATING DEVICE – A manually or automatically operated device, the normal intended operation of which results in a fire or emergency alarm.

3.6 REMOTE RECEIVER – A unit intended to receive an electrical, mechanical, or electromagnetic signal from a transmitter. When operation is initiated, the unit serves to control a signaling device such as a vibrator, flashing light, or the like.

3.7 REMOTE TRANSMITTER – A unit intended to transmit an electrical, mechanical, or electromagnetic signal to a remote receiver. Actuation of transmitter is initiated by an initiating device such as a smoke detector, thermostat, manual box, or the like.

3.8 SIGNALING DEVICE – A unit or equipment intended to convey a message or effect by means of the senses of sight or touch.

3.9 SIGNALING SYSTEM – A group of units or components that serve to make up a communication link between the initiating device and occupant where signaling is to occur.

3.10 SUPERVISED CIRCUIT – A circuit using a means to detect and indicate a fault condition that would prevent the transmission of an alarm signal. A fault condition is considered an open or ground in any electrical circuit interconnecting separate components necessary to form the signaling system.

3.11 UNCONTROLLED ENVIRONMENT – An area subjected to the natural environment conditions which make up the typical ambient and moisture conditions of this planet. For the purpose of this standard, the environmental limits are defined in the marking on the product. Where the conditions have not been addressed in the product marking, the product has only been evaluated for use in a controlled environment.

4 Instructions and Drawings

4.1 A copy of the operating and installation instructions and related schematic wiring diagrams shall be furnished with the sample submitted for investigation to be used in the examination and testing of the product or system. For this purpose a printed edition is not required.

4.2 The instructions and drawings shall include such directions and information for attaining the intended installation, maintenance, and operation of the product, including information as to classification, ratings, and the like, as applicable.

CONSTRUCTION

5 Enclosures

5.1 General

5.1.1 All electrical parts of a unit shall be enclosed to provide protection against contact with uninsulated live parts.

5.2 Cast metal

5.2.1 The thickness of cast metal for an enclosure shall be as indicated in Table 5.1. Cast metal having a thickness 1/32 inch (0.8 mm) less than that indicated in the table shall not be used unless the surface under consideration is curved, ribbed, or otherwise reinforced, or unless the shape or size or both of the surface is such that equivalent mechanical strength is provided.

Table 5.1
Cast metal enclosures

Use or dimensions of area involved[a]	Minimum thickness			
	Die-cast metal,		Cast metal of other than the die-cast type,	
	inch	(mm)	inch	(mm)
Area of 24 square inches (155 cm^2) or less and having no dimension greater than 6 inches (152 mm)	1/16	1.6	1/8	3.2
Area of 24 square inches (155 cm^2) or having any dimension greater than 6 inches (152 mm)	3/32	2.4	1/8	3.2
At a threaded conduit hole	1/4	6.4	1/4	6.4
At an unthreaded conduit hole	1/8	3.2	1/8	3.2

[a] The area limitation for metal 1/16 inch (1.6 mm) thick is obtained by the provision of reinforcing ribs subdividing a larger area.

5.2.2 If threads for the connection of conduit are tapped all the way through a hole in an enclosure wall, or if an equivalent construction is used, there shall not be less than 3-1/2 nor more than 5 threads in the metal, and the construction shall be such that a standard conduit bushing is capable of being attached.

5.2.3 If threads for the connection of conduit are tapped only part of the way through a hole in an enclosure wall, there shall not be less than five full threads in the metal, and there shall be a smooth, rounded inlet hole for the conductors which shall afford protection to the conductors equivalent to that provided by a standard conduit bushing.

5.2.4 There shall be adequate space within a terminal or wiring compartment to permit the use of a standard conduit bushing if a bushing is required for installation.

5.3 Sheet metal

5.3.1 The thickness of sheet metal used for the enclosure of a unit shall not be less than that indicated in Table 5.2 or 5.3 as applicable. Sheet metal of two gage sizes lesser thickness shall not be used unless the surface under consideration is curved, ribbed, or otherwise reinforced, or the shape or size or both of the surface is such that equivalent mechanical strength is provided. At any point where conduit or metal-clad cable is to be attached, sheet metal shall be of such thickness or shall be formed or reinforced so that it will have stiffness at least equivalent to that of an uncoated flat sheet of steel having a minimum thickness of 0.032 inch (0.81 mm).

Table 5.2
Minimum thickness of sheet metal for electrical enclosures – carbon steel or stainless steel

Without supporting frame[a]				With supporting frame or equivalent reinforcing[a]				Minimum thickness uncoated,		Minimum thickness metal coated,	
Maximum width,[b]		Maximum length,[c]		Maximum width,[b]		Maximum length,[c]					
inches	(cm)	inches	(cm)	inches	(cm)	inches	(cm)	inch	(mm)	inch	(mm)
4.0	10.2	Not limited		6.25	15.9	Not limited		0.020[d]	0.51[d]	0.023[d]	0.58[d]
4.75	12.1	5.75	14.6	6.75	17.1	8.25	21.0				
6.0	15.2	Not limited		9.5	24.1	Not limited		0.026[d]	0.66[d]	0.029[d]	0.74[d]
7.0	17.8	8.75	22.2	10.0	25.4	12.5	31.8				
8.0	20.3	Not limited		12.0	30.5	Not limited		0.032	0.81	0.034	0.86
9.0	22.9	11.5	29.2	13.0	33.0	16.0	40.6				
12.5	31.8	Not limited		19.5	49.5	Not limited		0.042	1.07	0.045	1.14
14.0	35.6	18.0	45.7	21.0	53.3	25.0	63.5				
18.0	45.7	Not limited		27.0	68.6	Not limited		0.053	1.35	0.056	1.42
20.0	50.8	25.0	63.5	29.0	73.7	36.0	91.4				
22.0	55.9	Not limited		33.0	83.8	Not limited		0.060	1.52	0.063	1.60
25.0	63.5	31.0	78.7	35.0	88.9	43.0	109.2				
25.0	63.5	Not limited		39.0	99.1	Not limited		0.067	1.70	0.070	1.78
29.0	73.7	36.0	91.4	41.0	104.1	51.0	129.5				
33.0	83.8	Not limited		51.0	129.5	Not limited		0.080	2.03	0.084	2.13
38.0	96.5	47.0	119.4	54.0	137.2	66.0	167.6				
42.0	106.7	Not limited		64.0	162.6	Not limited		0.093	2.36	0.097	2.46
47.0	119.4	59.0	149.9	68.0	172.7	84.0	213.4				
52.0	132.1	Not limited		80.0	203.2	Not limited		0.108	2.74	0.111	2.82
60.0	152.4	70.0	177.8	84.0	213.4	103.0	261.6				
63.0	160.0	Not limited		97.0	246.4	Not limited		0.123	3.12	0.126	3.20
73.0	185.4	90.0	228.6	103.0	261.6	127.0	322.6				

Table 5.2 Continued on Next Page

Table 5.2 Continued

Without supporting frame[a]				With supporting frame or equivalent reinforcing[a]				Minimum thickness uncoated,		Minimum thickness metal coated,	
Maximum width,[b] inches	(cm)	Maximum length,[c] inches	(cm)	Maximum width,[b] inches	(cm)	Maximum length,[c] inches	(cm)	inch	(mm)	inch	(mm)

[a] A supporting frame is a structure of angle or channel or a folded rigid section of sheet metal which is rigidly attached to and has essentially the same outside dimensions as the enclosure surface and which has sufficient torsional rigidity to resist the bending moments which are applied via the enclosure surface when it is deflected. One method of construction that is considered to have equivalent reinforcing is accomplished by constructions that produce a structure which is as rigid as one built with a frame of angles or channels. Constructions considered to be without supporting frame include:

1) Single sheet with single formed flanges (formed edges),

2) A single sheet which is corrugated or ribbed, and

3) An enclosure surface loosely attached to a frame, for example, with spring clips.

[b] The width is the smaller dimension of a rectangular sheet metal piece which is part of an enclosure. Adjacent surfaces of an enclosure may have supports in common and be made of a single sheet.

[c] For panels that are not supported along one side, for example, side panels of boxes, the length of the unsupported side shall be limited to the dimensions specified unless the side in question is provided with a flange at least 1/2 inch (12.7 mm) wide.

[d] Sheet steel for an enclosure intended for outdoor use (rain resistant) shall not be less than 0.036 inch (0.91 mm) thick if zinc coated and not less than 0.032 inch (0.81 mm) thick if uncoated.

Table 5.3
Minimum thickness of sheet metal for electrical enclosures – aluminum, copper, or brass

Without supporting frame[a]				With supporting frame or equivalent reinforcing[a]				Minimum thickness,	
Maximum width,[b] inches	(cm)	Maximum length,[c] inches	(cm)	Maximum width,[b] inches	(cm)	Maximum length,[c] inches	(cm)	inch	(mm)
3.0	7.6	Not limited		7.0	17.8	Not limited			
3.5	8.9	4.0	10.2	8.5	21.6	9.5	24.1	0.023[d]	0.58[d]
4.0	10.2	Not limited		10.0	25.4	Not limited			
5.0	12.7	6.0	15.2	10.5	26.7	13.5	34.3	0.029	0.74
6.0	15.2	Not limited		14.0	35.6	Not limited			
6.5	16.5	8.0	20.3	15.0	38.1	18.0	45.7	0.036	0.91
8.0	20.3	Not limited		19.0	48.3	Not limited			
9.5	24.1	11.5	29.2	21.0	53.3	25.0	63.5	0.045	1.14
12.0	30.5	Not limited		28.0	71.1	Not limited			
14.0	35.6	16.0	40.6	30.0	76.2	37.0	94.0	0.058	1.47
18.0	45.7	Not limited		42.0	106.7	Not limited			
20.0	50.8	25.0	63.5	45.0	114.3	55.0	139.7	0.075	1.91
25.0	63.5	Not limited		60.0	152.4	Not limited			
29.0	73.7	36.0	91.4	64.0	162.6	78.0	198.1	0.095	2.41
37.0	94.0	Not limited		87.0	221.0	Not limited			
42.0	106.7	53.0	134.6	93.0	236.2	114.0	289.6	0.122	3.10
52.0	132.1	Not limited		123.0	312.4	Not limited			
60.0	152.4	74.0	188.0	130.0	330.2	160.0	406.4	0.153	3.89

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Table 5.3 Continued

Without supporting frame[a]				With supporting frame or equivalent reinforcing[a]				
Maximum width,[b] inches	(cm)	Maximum length,[c] inches	(cm)	Maximum width,[b] inches	(cm)	Maximum length,[c] inches	(cm)	Minimum thickness, inch (mm)

[a] A supporting frame is a structure of angle or channel or a folded rigid section of sheet metal which is rigidly attached to and has essentially the same outside dimensions as the enclosure surface and which has sufficient torsional rigidity to resist the bending moments which are applied via the enclosure surface when it is deflected. One method of construction that is considered to have equivalent reinforcing is accomplished by constructions that produce a structure which is as rigid as one built with a frame of angles or channels. Constructions considered to be without supporting frame include:

1) Single sheet with single formed flanges (formed edges),

2) A single sheet which is corrugated or ribbed, and

3) An enclosure surface loosely attached to a frame, for example, with spring clips.

[b] The width is the smaller dimension of a rectangular sheet metal piece which is part of an enclosure. Adjacent surfaces of an enclosure may have supports in common and be made of a single sheet.

[c] For panels that are not supported along one side, for example, side panels of boxes, the length of the unsupported side shall be limited to the dimensions specified unless the side in question is provided with a flange at least 1/2 inch (12.7 mm) wide.

[d] Sheet copper, brass, or aluminum for an enclosure intended for outdoor use (rain resistant) shall not be less than 0.029 inch (0.74 mm) thick.

5.3.2 An enclosure shall have means for mounting, which shall be accessible without disassembling any operating part of the product.

5.3.3 In reference to the requirement in 5.3.2, removal of the completely assembled panel, such as an internal mounting plate, is not considered to be disassembly of an operating part.

5.4 Plastic

5.4.1 Integrity of enclosure and the ability of the signaling unit to operate unimpaired after mechanical abuse shall be determined by any combination of the Drop Test, Section 42; the Impact Test, Section 43; and the Crush Test, Section 44; as applicable.

5.4.2 Units operating from a voltage source greater than 30 V rms or 42.4 V DC, and 15 W or higher, shall comply with the flammability requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C. Refer to Figure 5.1 for flammability requirements concerning portable, fixed, and stationary appliances.

Exception: The plastic material that makes up the lens shall have a minimum rating of V-2 when it does not serve as the enclosure. The lens shall maintain the same level of mechanical integrity as specified for the enclosure.

5.4.3 Units operating at less than 30 V rms or 42.4 V DC and less than 15 W shall use plastic having a minimum flammability rating of HB.