



UL 1023

STANDARD FOR SAFETY

Household Burglar-Alarm System Units

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UL Standard for Safety for Household Burglar-Alarm System Units, UL 1023

Seventh Edition, Dated September 1, 2017

Summary of Topics

This revision of ANSI/UL 1023 dated May 20, 2021 includes a clarification of short range RF requirements for household burglar alarm products to address frequency hopping and spread spectrum technologies; [62.3](#), [63.1](#), [63.4](#), [63.5](#), [64.1](#), [67.2](#), and [68.3](#)

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 January 29, 2021.

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SEPTEMBER 1, 2017
(Title Page Reprinted: May 20, 2021)



ANSI/UL 1023-2021

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UL 1023

Standard for Household Burglar-Alarm System Units

First Edition – March, 1972
Second Edition – August, 1978
Third Edition – October, 1978
Fourth Edition – September, 1985
Fifth Edition – September, 1991
Sixth Edition – November, 1996

Seventh Edition

September 1, 2017

This ANSI/UL Standard for Safety consists of the Seventh edition including revisions through May 20, 2021.

The most recent designation of ANSI/UL 1023 as an American National Standard (ANSI) occurred on May 20, 2021. 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 burglar-alarm system units intended for use in residences to protect a complete multiroom residence, one room of a residence, or one opening or area in a residence.

1.2 Household burglar-alarm system units covered by these requirements consist of one or more unit assemblies of electrical components that are designed to detect the presence, movement, sound, or other activity of an intruder. Provisions are made for the connection of a power supply, remote control, and signal circuits by a prescribed method of wiring. These system units usually operate within the limits of Class 2 remote control and signal circuits as defined by Article 725 of the National Electrical Code, NFPA 70.

1.3 These requirements also apply to the use of combination systems, such as a combination fire-burglar-alarm system control unit. A combination system is connected in such a manner that fault conditions (shorts, opens, grounds) in the burglar-alarm system circuit wiring, or interconnections between the fire- and burglar-alarm system circuits, will not interfere with the supervision of the fire alarm system or will not prevent intended alarm signal operation.

1.4 A combination household fire and burglar alarm system shall also comply with the Standard for Household Fire Warning System Units, UL 985.

1.5 These requirements cover accessories that are external to the control unit and that are dependent upon the control unit function, such as end-of-line devices, annunciators, remote switches, and the like.

1.6 Intrusion detection devices, such as motion detectors or sound detectors, are covered by the Standard for Intrusion-Detection Units, UL 639.

1.7 A household burglar alarm system shall provide supervision of the initiating device circuits, so that if there is an open in the circuit or failure of a transmitter device's ability to communicate with its receiver, the open or failure to transmit will be indicated to the alarm system user.

1.8 Only alarm equipment determined acceptable for household burglar alarm service may be installed under the requirements contained in the Standard for Installation and Classification of Residential Burglar Alarm Systems, UL 1641.

2 Components

2.1 Except as indicated in [2.2](#), 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.

2.2 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.

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

2.4 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.

2.5 If a digital alarm communicator transmitter is used to transmit signals to a remote location and is to be included as a component of the system, it shall comply with the applicable requirements in the Standard for Digital Alarm Communicator System Units, UL 1635. For other transmission methods, the system shall comply with the Standard for Central Station Burglar Alarm Units, UL 1610 (with the applicable exceptions for residential applications). Otherwise the user must be notified that the off-premises transmission method has not been so investigated.

Exception: Packet switched data network alarm communicator transmitters intended for use in residential burglar-alarm systems are not required to identify and report a loss of connection/signal within 200 seconds at the central station receiving unit. The transmitter shall contact the receiver with an identifiable signal at least once every 30 days.

3 Units of Measurement

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

4 Undated References

4.1 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.

5 Terminology

5.1 The term "product" as used in these requirements refers to all types of household burglar-alarm system units.

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

6 Glossary

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

6.2 ALARM SIGNAL – An audible signal indicating an alarm condition requiring immediate action, such as an alarm initiated from an intrusion detector, door switch, floor mat, or the like.

6.3 ANNUNCIATOR – An externally-connected electrically operated visual indicating device containing one or more identified targets or indicator lamps in which each target or lamp indicates the circuit condition, location, or both.

6.4 CIRCUITS, ELECTRICAL –

a) Class 2 – A circuit in which the voltage and power limitations are in accordance with the requirements of [Table 32.1](#) for AC circuits and [Table 32.2](#) for DC circuits.

b) Class 3 – A circuit in which the voltage and power limitations are in accordance with the requirements of [Table 32.1](#) for AC circuits and [Table 32.2](#) for DC circuits.

c) High-Voltage (Class 1) – 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.

d) Low-Voltage – A circuit involving a potential of not more than 30 volts AC rms, 42.4 volts DC or AC peak.

e) Power-Limited – A circuit wherein the power and current are limited as specified in [Table 32.1](#) and [Table 32.2](#).

6.5 CONTROL UNIT ACCESSORY – A device or appliance externally connected to a control unit that is employed to assure the intended operation of a system or to provide supplementary signaling, announcement, or both. Examples of control unit accessories are: annunciators, end-of-line resistors or diodes, auxiliary relays, or remote switches.

6.6 DISTINCTIVE SIGNALS – Signals obtained from different sounding appliances, such as bells, horns, sirens, and buzzers, or from a single appliance, such as an electronic horn, where a continuous signal is obtained under one condition and a pulsing signal under another.

6.7 END-OF-LINE RESISTOR – A resistor installed at the end of an initiating or indicating device circuit to limit the amount of supervisory current.

6.8 LINE-VOLTAGE – The voltage at any field connected source of supply, nominally 50 – 60 hertz, and either 115, 208, or 230 volts.

6.9 PRIMARY BATTERY – A battery that by construction is not intended to be recharged.

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

6.11 SECONDARY BATTERY – A battery that by construction, is intended to be recharged.

6.12 TROUBLE SIGNAL – Visual or audible signal indicating a fault condition of any nature, such as an open or ground or other trouble condition, occurring in the product or connected wiring.

6.13 TRAINED INSTALLER – An individual knowledgeable in the product operation and who has received instruction on installing the product.

7 Instructions and Drawings

7.1 Each unit shall be provided with installation instructions and drawings that shall include the following information:

a) Typical installation drawing layouts and a complete representative installation wiring diagram(s) for the product (s) indicating recommended locations and wiring methods that shall be in accordance with the National Electrical Code, ANSI/NFPA 70.

b) Concise description of the operation, testing, and maintenance procedures for the product(s).

c) Identification of replacement parts, such as lamps or batteries, by a part number, manufacturer's model number, or the equivalent.

d) A description of the conditions that might be expected to result in false alarms or impaired operation of the product(s).

e) A description of the protective features and a warning against bypassing such features.

f) Instructions that an automatic telephone dialer or similar device shall not be set or programmed to place a call to a police station number that has not been specifically assigned by that police station for such service.

7.2 The user shall be instructed to replace rechargeable batteries as recommended by the battery manufacturer.

7.3 A warning of precautions necessary to prevent premature battery failure, if any precautions are necessary, shall be contained in the installation instructions and shall include position of mounting, temperature limits, state-of-charge, and periods of inactivity if the battery is of a type that may lose capacity due to these conditions. Markings on the unit adjacent to the battery shall indicate battery type and estimated life, and a method of testing battery condition.

7.4 The instructions may be incorporated on the inside of the product, on a separate sheet, or as part of a manual. If not included directly on the product, the instructions or manual shall be referenced in the marking information on the product. See Markings, Details, Section [89](#).

Exception No. 1: For products intended only to be installed by a trained installer, the installation instructions containing the information required by [7.1](#) – [7.3](#) is not prohibited from being made available by one or more of the following means:

- a) *Electronic instructions within the basic product software;*
- b) *Electronic media such as website, CD-ROM, DVD, etc.; or*
- c) *When the instructions are included as described in (a) or (b), the instructions shall be referenced in the product marking by:*
 - 1) *Name or trademark of manufacturer,*
 - 2) *Drawing number, URL address (This may be a root or home page and not a specific location), and/or equivalent identification, and*
 - 3) *Issue date, revision level, and/or release date, or equivalent information such as date of manufacture or firmware level, which correlates the applicable digital manual revision to the product's current hardware/software. (For example, the product is marked with the date of manufacture or firmware level and the digital manual references the date or firmware range to which the manual is applicable).*

Exception No. 2: Installation instructions for products that require an Internet connection for initial configuration containing the information required by [7.1](#) – [7.3](#) is not prohibited from being made available by the means provided in [7.4](#), Exception No. 1, given the requirements of one of the following are met:

- a) *Where hardcopy installation instructions are not provided, the product annunciates an audible trouble signal when the product is energized until the product is setup; or*
- b) *A constant signal visible to the user after the product is installed is permitted to be used in lieu of the audible trouble signal required by [7.4](#) Exception No. 2(a) when the following information is provided in hardcopy with the product:*
 - 1) *Statement the device must be installed and configured before it is to be used,*
 - 2) *Statement the full manual is to be obtained before installation is started and the website or online location where it is available, and*
 - 3) *Description of the visual indication given and its meaning.*

CONSTRUCTION

ASSEMBLY

8 General

8.1 Unless specifically indicated otherwise, the construction requirements specified for a product shall apply also for any remote accessories with which it is to be employed.

8.2 Uninsulated high-voltage live parts or moving parts that may cause injury to persons shall be located, guarded, or enclosed to prevent contact by persons during servicing conditions such as relamping, changing fuses, adjusting controls, battery replacement and maintenance, and operating switches. Protection by insulating tape, barriers, or the equivalent, over exposed current-carrying parts operating at high-voltage meets these requirements.

9 Test Features

9.1 Means provided for testing the battery condition or other aspect of the system, shall not result in a risk of fire, electric shock, or injury to persons, and shall be constructed and located to prevent unintended operation of the system by unauthorized personnel.

9.2 The product shall be provided with a test feature or method that will evaluate the capability of each critical component, from sensor(s) to alarm, under all modes of operation.

Exception: A critical component provided with a trouble or alarm signal need not be evaluated by the test feature. A product employing a trouble or alarm signal on each critical component need not have a test feature.

9.3 With reference to the requirements in [9.2](#), a critical component is defined as a component whose malfunctioning will impair the intended operation of the product or may involve a risk of fire or electric shock.

10 Enclosures

10.1 General

10.1.1 The frame and enclosure shall have strength and rigidity to resist total or partial collapse and the attendant reduction of spacings, loosening or displacement of parts, and development of other conditions that may impair operation of the product or increase the risk of fire, electric shock, or injury to persons. See [Table 10.1](#) – [Table 10.3](#) and the Mechanical Strength Test for Enclosures, Section [59](#).

Table 10.1
Cast-metal electrical enclosures

Use, or dimension of area involved	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) ^a	1/16	(1.6)	1/8	(3.2)
Area greater than 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) in thickness may be obtained by the provision of reinforcing ribs subdividing a larger area.

Table 10.2
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	inch	(mm)	inch	(mm)
inches	(cm)	inches	(cm)	[MSG]		[GSG]	
4.0	(10.2)	Not limited	6.25	(15.9)	Not limited	0.020	(0.51)
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	(0.66)
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)
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)
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)
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)
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)
29.0	(73.7)	36.0	(91.4)	104.1	(104.1)	51.0	(129.5)
33.0	(83.8)	Not limited	51.0	(129.5)	Not limited	0.080	(2.03)
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)
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)
60.0	(152.4)	74.0	(188.0)	84.0	(213.4)	103.0	(261.6)
63.0	(160.0)	Not limited	97.0	(246.4)	Not limited	0.123	(3.12)
73.0	(185.4)	90.0	(228.6)	103.0	(261.6)	127.0	(322.6)

Table 10.2 Continued on Next Page

Table 10.2 Continued

Without supporting frame ^a		With supporting frame or equivalent reinforcing ^a		Minimum thickness uncoated, inch (mm) [MSG]	Minimum thickness metal coated, inch (mm) [GSG]
Maximum width, ^b inches (cm)	Maximum length, ^c inches (cm)	Maximum width, ^b inches (cm)	Maximum length, inches (cm)		
^a A supporting frame is a structure of angle or channel or a folded rigid section of sheet metal that is rigidly attached to and has essentially the same outside dimensions as the enclosure surface and that has sufficient torsional rigidity to resist the bending moments that may be applied via the enclosure surface when it is deflected. Construction that is considered to have equivalent reinforcing may be accomplished by designs that will produce a structure that is as rigid as one built with a frame of angles or channels. Construction considered to be without supporting frame includes: <ol style="list-style-type: none"> 1) A single sheet with single support flanges (formed edges); 2) A single sheet that is corrugated or ribbed; and 3) An enclosure surface loosely attached to a frame, that is, with spring clips. 					
^b The width is the smaller dimension of a rectangular sheet metal piece that 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 which 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.					

Table 10.3
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, inches (mm)
Maximum width, ^b inches (cm)	Maximum length, ^c inches (cm)	Maximum width, ^b inches (cm)	Maximum length, inches (cm)	
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 (0.58)
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)

^a A supporting frame is a structure of angle or channel or a folded rigid section of sheet metal that is rigidly attached to and has essentially the same outside dimensions as the enclosure surface and that has sufficient torsional rigidity to resist the bending moments that may be applied via the enclosure surface when it is deflected. Construction that is considered to have equivalent

Table 10.3 Continued on Next Page

Table 10.3 Continued

Without supporting frame ^a		With supporting frame or equivalent reinforcing ^a		Minimum thickness, inches (mm)
Maximum width, ^b inches (cm)	Maximum length, ^c inches (cm)	Maximum width, ^b inches (cm)	Maximum length, inches (cm)	
reinforcing may be accomplished by designs that will produce a structure that is as rigid as one built with a frame of angles or channels. Construction considered to be without supporting frame includes: <ol style="list-style-type: none"> 1) A single sheet with single support flanges (formed edges); 2) A single sheet that is corrugated or ribbed; and 3) An enclosure surface loosely attached to a frame, that is, with spring clips. 				
^b The width is the smaller dimension of a rectangular sheet metal piece that 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 which 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.				

10.1.2 Electrical parts of a product shall be located or enclosed to provide protection against unintentional contact with uninsulated high-voltage live parts.

10.1.3 Operating parts, such as gear mechanisms, light-duty relays, and similar devices, shall be enclosed to protect against malfunction from dust or other material that may impair their intended operation. See the Dust Test, Section [43](#).

10.1.4 The mounting means of an enclosure shall be accessible without disassembly of any operating part of the product. Removal of a completely assembled panel to mount the enclosure is not considered to be disassembly of an operating part.

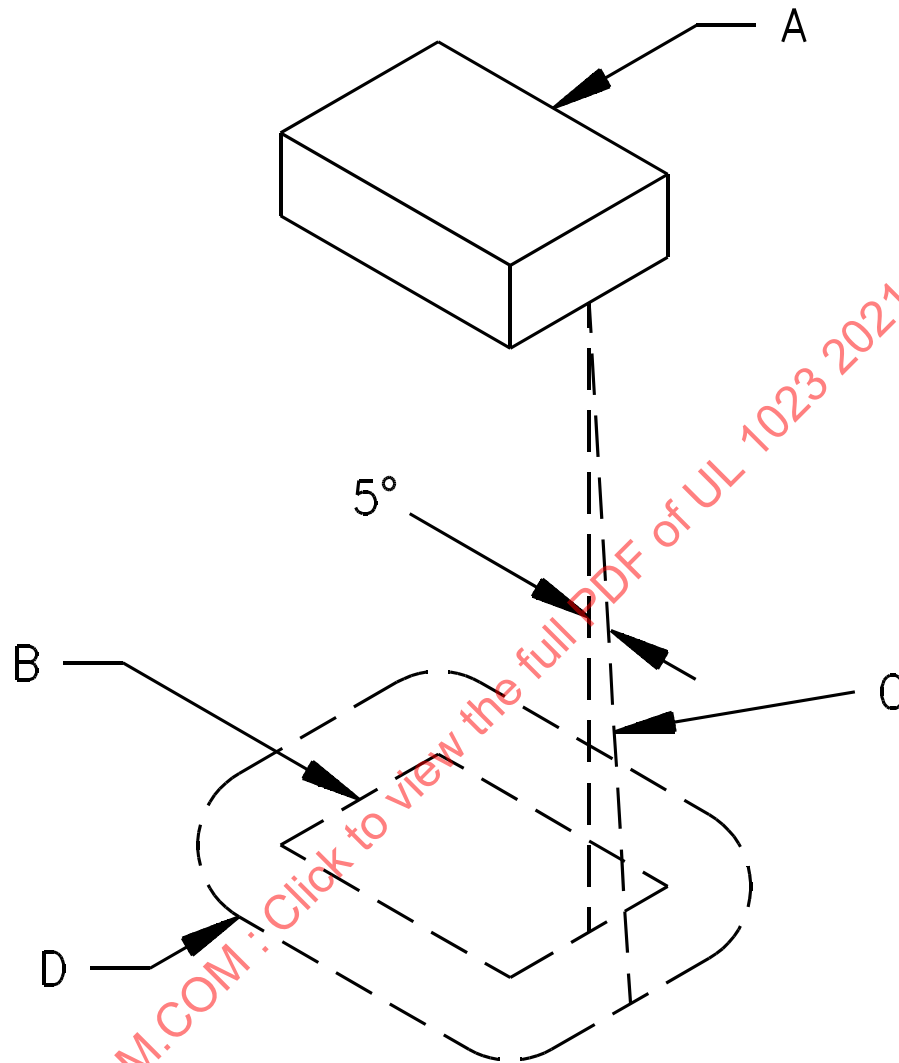
10.1.5 An enclosure shall be constructed to minimize the possibility of emission of flame, molten metal, flaming or glowing particles, or flaming drops. See the Abnormal Operation Test, Section [50](#) and the Ignition Through Bottom-Panel Openings Test, Section [58](#).

10.1.6 The requirement in [10.1.5](#) necessitates either a nonflammable bottom in accordance with [10.2.3](#), or a protective barrier as described in [Figure 10.1](#) under all areas containing flammable materials.

Exception: Materials or assemblies classified as V-1 are not required to comply with this requirement; see the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

10.1.7 A construction employing individual barriers under components, groups of components or assemblies, as specified in [Figure 10.1](#), is to be considered as complying with the requirement in [10.1.6](#).

Figure 10.1
Protective pan



EB120A

A. The entire component under which a barrier (flat or dish with or without a lip or other raised edge) of noncombustible material is to be provided. The sketch above is of a metal enclosed component with ventilating openings to show that the protective barrier is required only for those openings from which flaming parts might come. If the component or assembly does not have its own noncombustible enclosure, the area to be protected would be the entire area occupied by the component or assembly.

B. Projection of the outline of the area of (A) which needs a bottom barrier vertically downward onto the horizontal plane of the lowest point on the outer edge (D) of the barrier.

C. Inclined line that traces out an area (D) on the horizontal plane of the barrier. Moving around the perimeter of the area (B) which needs a bottom barrier, this line projects at a 5-degree angle from the line extending vertically at every point around the perimeter of (A) and oriented to trace out the largest area, except that the angle may be less than 5 degrees if the barrier or portion of the bottom cover contacts a vertical barrier or side panel of noncombustible material, or if the horizontal extension of the barrier (B) to (D) would exceed 6 inches (150 mm).

D. Minimum outline of the barrier, except that the extension B – D need not exceed 6 inches (150 mm) (flat or dished with or without lip or other raised edge). The bottom of the barrier may be flat or formed in any manner provided that every point of area (D) is at or below the lowest point on the outer edge of the barrier.