UL 497A

STANDARD FOR SAFETY

Secondary Protectors for Communications Circuits

UL Standard for Safety for Secondary Protectors for Communications Circuits, UL 497A

Third Edition, Dated March 20, 2001

Summary of Topics

This reaffirmation of ANSI/UL 497A dated December 3, 2024 is being issued to update the title page to reflect the latest ANSI approval date as a Reaffirmed American National Standard (ANS). No changes in requirements are involved.

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

The requirements are substantially in accordance with Proposal(s) on this subject dated October 4, 2024.

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UL 497A

Standard for Secondary Protectors for Communications Circuits

First Edition – January, 1990
Second Edition – January, 1996

Third Edition

March 20, 2001

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through December 3, 2024.

The most recent designation of ANSI/UL 497A as a Reaffirmed American National Standard (ANS) occurred on December 3, 2024. 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 ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

No Text on This Page

CONTENTS

INTRODUCTION

CONSTRUCTION

RISK OF INJURY TO PERSONS

PERFORMANCE

INTRODUCTION

1 Scope

1.1 These requirements cover secondary protectors for use in single- or multiple-pair-type communications circuits that are intended to be installed in accordance with Article 800 of the National Electrical Code, ANSI/NFPA 70.

1.2 Secondary protectors are intended to be used in the protected side of telecommunications networks that have an operating rms voltage to ground less than 150 volts and installed or used in accordance with the National Electrical Code, NFPA 70.

1.3 These requirements do not cover telephone protectors that are covered by the Standard for Protectors for Paired-Conductor Communications Circuits, UL 497. These requirements do not cover telephone equipment such as telephone answering devices, residential telephone instruments, telephone dialers, cordless telephones, key systems, and private-branch exchange equipment that is covered by the Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1 or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

1.4 These requirements do not cover cellular telephones or other receiver/transmitter-type devices. Equipment of this type is covered by one of the following Standards:

- Standard for Audio, Video and Similar Electronic Apparatus – Safety Requirements, UL 60065
- Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1; or
- Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

1.5 These requirements may be used, directly or by reference, to investigate portions of other equipment not classified as telecommunications equipment accessories and that may be connected to a telecommunications network, insofar as they may be applicable to such equipment.

1.6 These requirements do not cover wires and cables intended to be permanently installed in a building in accordance with Article 800 of the National Electrical Code, NFPA 70.

1.7 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

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.

2.2.2 Unless otherwise indicated, all voltage and current values specified in this standard are root-mean-square (rms).

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.

3.2 EARTH GROUND – A conducting connection, whether intentional or unintentional, between an electrical circuit or electrical equipment and the earth, or to some conducting body that serves in place of the earth.

3.3 ELECTRICAL ENERGY – HIGH CURRENT LEVELS (POWER SUPPLIES) – Electrical energy that is capable of causing damage or risk of injury to persons (other than by electric shock) is determined to exist when, between a live part and an adjacent dead-metal part or between live parts of opposite polarity, there exists a potential of not less than 30 volts rms or 42.4 volts peak (AC or DC) and either:

a) An available continuous power level of not less than 250 volt-amperes or

b) A reactive energy level of not less than 20 joules.

For example, a tool or other metal short-circuiting a component can cause a burn or a fire when enough energy is available at the component to vaporize, melt, or more than warm the metal.

3.4 ENCLOSURE – The word "enclosure" refers only to parts that house or cover:

a) Uninsulated live parts that involve a risk of electric shock or

b) Parts that involve a risk of fire, electrical energy/high-current levels, or injury to persons.

An enclosure may be an integral part of a component, a separate item or part of an outer cabinet.

3.5 FIELD-WIRING TERMINAL – A terminal to which a telephone circuit may be connected by an installer in the field. A field-wiring terminal may consist of a screw-type terminal, quick-connect insulation stripping system, or plug/jack arrangement.

3.6 FIXED OR STATIONARY EQUIPMENT – Equipment that is not easily moved, and is intended to be moved from one place to another only when de-energized. Fixed equipment is usually fastened or secured to a building.

3.7 GROUNDING – Establishing an intentional electrically conductive connection between an electrical circuit or electrical equipment and the earth ground or to some conducting body that serves in place of the earth.

3.8 LONGITUDINAL VOLTAGE – (May also be called Common Mode Voltage) When applied to telecommunications conductors, the voltage common to both tip and ring conductors or the connection points of such conductors, as measured with regard to earth ground.

3.9 METALLIC VOLTAGE – (May also be called Differential Mode Voltage) When applied to telecommunications conductors, the voltage as measured between tip and ring conductors, of the same telecommunications pair, or the connection points of such tip and ring conductors, with no reference to earth ground.

3.10 NETWORK OPERATING VOLTAGES – Telecommunications networks normally operate at voltages of 56.5 volts DC or less, unless the source impedance is over 1600 ohms. For equipment connected to a single tip and ring pair, alerting and test voltages higher than 56.5 volts are intermittent and will be present over less than 1 percent of the usage of the equipment. Some telecommunications equipment, such as PBX and Key systems, may have a greater percentage of usage or operate at a higher voltage (such as T type lines). Maximum ringing voltages may not exceed 150 volts as defined by Article 725 of the National Electrical Code for Class 2 and 3 circuits.

3.11 NONPROTECTED SIDE – The portion of the loop circuit that rests on the central office or outside plant side of the primary telephone protector installed by the operating telephone company. The fault current limitation is subject to the breakdown voltage characteristics of the primary protector and its coordinated fusing system with the bridle or fuse wire with which the protector is intended to be used.

3.12 PORTABLE EQUIPMENT – Equipment that is easily moved and can be carried or conveyed by hand. Portable equipment is usually hand-held or hand-supported.

3.13 PRIMARY PROTECTOR – A voltage-limiting protector complying with the Standard for Protectors for Paired-Conductor Communications Circuits, UL 497.

3.14 PRODUCT – This term refers to all types of telephone equipment and appliances that will be used in residential, commercial, and industrial environments.

3.15 PROTECTED SIDE – Refers to that portion of the loop circuit that rests on the customer premises side of the primary telephone protector and is limited to short and long term current requirements for secondary protectors.

3.16 RISK OF ELECTRIC SHOCK – The risk that a person encounters when exposed to uninsulated live parts of a product that have a voltage and current sufficient to cause an electric shock, as defined in Accessibility and Electric Shock, Section 8.

3.17 RISK OF FIRE – The risk that a fire may occur as a result of equipment or component failure or the application of specified test conditions. A risk of fire is determined to exist at any component unless an

investigation of the circuit delivering power to that component complies with the power limitations criteria cited in this standard.

3.18 RISK OF INJURY TO PERSONS – A condition that is capable of occurring when one or more of the following exist:

a) When power-operated moving parts such as gears and linkages are accessible during intended operation and are capable of causing a cut or laceration.

b) When sharp edges, burrs, or projections are present that results in injury during use or servicing.

c) When the stability of a product is such that it results in injury to persons. See Stability, Section 22.

d) When there is risk that a part of the body could become endangered or that clothing could become entangled by a moving part resulting in an injury.

e) When uninsulated live parts involving risk of electrical-energy/high-current levels are accessible to personnel. See Accessibility and Electric Shock, Section 8.

f) When contact with accessible live parts can cause an involuntary reaction where the consequence of the reaction is a high risk of injury. See Accessibility and Electric Shock, Section 8.

g) When, during operation, the product propels missiles or other objects that may result in injury to persons.

3.19 TELECOMMUNICATIONS – Any transmission or reception of information such as signals, images, written text, or sounds, by electronic means.

3.20 TELECOMMUNICATIONS LINE CORD – The flexible cord used to connect a telephone set or other telecommunications devices to the telecommunications line at the network interface or modular jacks within the loop circuit. The cord may have male locking-type modular connectors on one or both ends for a plug-in arrangement or may have spade terminals on either or both ends for screw-type connections.

3.21 TELECOMMUNICATIONS LINE CORD EXTENSION – A telecommunications line cord that has a male connector on one end and a female connector on the other end.

3.22 TELECOMMUNICATIONS NETWORK – The interconnection of communications lines and switching equipment for providing communications service.

3.23 TELECOMMUNICATIONS NETWORK INTERFACE DEVICE – A piece of equipment that provides a point of interconnection between the telephone company communications facilities and terminal equipment, wiring, and protective apparatus at a subscriber's premises. The network interface or demarcation point is located on the subscriber's side of the telephone company's protector, or the equivalent thereof in cases where the protector is not employed, as provided under local telephone company's reasonable and nondiscriminatory standard operating practices. Network interface devices may contain the telephone primary protector within the unit.

3.24 TELECOMMUNICATIONS (TELEPHONE) EQUIPMENT – A device intended to be connected to a telecommunications network and used for receiving or transmitting information, or both, along the network.

3.25 TELEPHONE BRANCH CIRCUIT – The circuit that consists of a single pair conductor wire run in parallel with the main loop circuit. The junction point of the two circuits is usually contained in a cross-connect terminal block, network interface device assembly, or multi-output RJ11 type jack assembly.

3.26 TIP AND RING WIRES (TELEPHONE SWITCHING SYSTEMS) – A pair of conductors associated with the transmission portions of circuits and apparatus. Tip or ring designation of the individual conductors may be arbitrary except when applied to cord-type switchboard wiring in which case the conductors are designated according to their association with tip or ring contact of the jack and plug.

3.27 TOOL – Any means, other than manual manipulation, required to open an enclosure of a device.

3.28 USER SERVICING – Any form of servicing that can be performed by personnel other than those who are trained to maintain the equipment. User servicing is limited to user's access area. Some examples of user servicing are:

a) The installation of accessories by means of separable connectors such as modular connectors, attachment plugs and receptacles and

b) The changing or replacement of accessory boards, lamps, fuses and resetting of circuit breakers.

3.29 USER'S ACCESS AREA – All external surface areas and all internal areas that can be entered without the use of a tool, and all areas that the user is instructed to enter whether or not tools are required to gain access.

CONSTRUCTION

4 General

4.1 A secondary protector shall be constructed so that it will be durable for its intended installation and use, as determined by compliance with the performance requirements of this standard.

4.2 A secondary protector shall include overcurrent protection which will fuse, limit, or extinguish at currents less than the current-carrying capacity of indoor communications wire, cable or terminal equipment. Any overvoltage protection or grounding connection shall be connected on the equipment terminal side of the secondary protector overcurrent protection system.

4.3 A product shall employ materials that are intended for the particular use, as determined by the performance requirements of this standard.

4.4 Metals shall not be used in such combination as to cause galvanic action that will result in a risk of fire, electric shock, or injury to persons.

4.5 When breakage or deterioration of a part such as an enclosure, a frame, a guard, or the like can result in a risk of injury to persons, the part shall be constructed to meet the demand of expected loading conditions.

5 Product Assembly

5.1 A product shall be factory-built as a complete assembly and shall include all the essential components required for its intended function when installed (used) as intended. The product may be shipped from the factory as two or more subassemblies.

5.2 A product may be shipped from the factory unassembled, or disassembled to the degree required to facilitate shipment, when all of the following conditions are met:

a) All of the parts are furnished by the manufacturer;

b) Upon assembly, grounding continuity is provided where required between the field-assembled components;

c) The product is constructed so that field assembly can be accomplished without requiring drilling, cutting, threading, or any alteration other than the attachment of field-installed electrical conduit or raceway;

d) The relationship between separate parts is established at the time of manufacture, and is not dependent upon installation personnel;

e) Detailed step-by-step installation instructions are packaged with the product; and

f) All protective guards and other features intended to reduce the risk of fire, electric shock, or injury to persons are factory installed wherever possible.

6 Enclosures

6.1 General

6.1.1 An enclosure shall have the strength and rigidity required to resist the abuses to which the product will be subjected during intended use, without resulting in:

a) A risk of fire, electric shock, or injury to persons due to total or partial collapse, with resulting reduction of spacings to less than required or

b) Loosening, displacement or exposure of parts or other defects.

6.1.2 An enclosure or guard of sheet metal shall have a minimum thickness in accordance with Table 6.1 or Table 6.2, whichever applies.

Table 6.1
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,	
inches	(cm)	inches	(cm)	inches	(cm)	inches	(cm)	inch [MSG]	(mm)	inch [GSG]	(mm)
4.0	(10.2)	Not limited		6.25	(15.9)	Not limited		0.020	(0.51)	0.023	(0.58)
4.75	(12.1)	5.75	(14.6)	6.75	(17.1)	8.25	(21.0)	[24]		[24]	
6.0	(15.2)	Not limited		9.5	(24.1)	Not limited		0.026	(0.66)	0.029	(0.74)
7.0	(17.8)	8.75	(22.2)	10.0	(25.4)	12.5	(31.8)	[22]		[22]	
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)	[20]		[20]	
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]		[18]	
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)	[16]		[16]	
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)	[15]		[15]	

Table 6.1 Continued on Next Page

Table 6.1 Continued

Without supporting frame[a]				With supporting frame or equivalent reinforcing[a]				Minimum thickness uncoated,		Minimum thickness metal coated,	
inches	(cm)	inches	(cm)	inches	(cm)	inches	(cm)	inch [MSG]	(mm)	inch [GSG]	(mm)
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)	[14]		[14]	
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)	[13]		[13]	
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)	[12]		[12]	
52.0	(132.1)	Not limited		80.0	(203.2)	Not limited		0.108	(2.74)	0.111	(2.82)
60.0	(152.4)	74.0	(188.0)	84.0	(213.4)	103.0	(261.6)	[11]		[11]	
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)	[10]		[10]	

NOTE – Sheet steel for an enclosure intended for outdoor use (watertight) shall be at least 0.036 inch (0.91 mm) thick when zinc-coated and at least 0.032 inch (0.81 mm) thick when uncoated.

[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. A structure that is as rigid as one built with a frame of angles or channels is considered to have equivalent reinforcing. Constructions considered to be without supporting frames include:

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

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

3) An enclosure surface loosely attached to a frame, such as by 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 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 continuous flange at least 1/2 inch (12.7 mm) wide.

Table 6.2
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 in inches (mm)	
Maximum width[b], inches	(cm)	Maximum length[c], inches	(cm)	Maximum width[b], inches	(cm)	Maximum length,[c] inches	(cm)		
3.0	(7.6)	Not limited		7.0	(17.8)	Not limited		0.023	(0.58)
3.5	(8.9)	4.0	(10.2)	8.5	(21.6)	9.5	(24.1)		
4.0	(10.2)	Not limited		10.0	(25.4)	Not limited		0.029	(0.74)
5.0	(12.7)	6.0	(15.2)	10.5	(26.7)	13.5	(34.3)		
6.0	(15.2)	Not limited		14.0	(35.6)	Not limited		0.036	(0.91)
6.5	(16.5)	8.0	(20.3)	15.0	(38.1)	18.0	(45.7)		
8.0	(20.3)	Not limited		19.0	(48.3)	Not limited		0.045	(1.14)

Table 6.2 Continued on Next Page