



UL 1419

STANDARD FOR SAFETY

Professional Video and Audio
Equipment

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UL Standard for Safety for Professional Video and Audio Equipment, UL 1419

Fourth Edition, Dated February 26, 2016

Summary of Topics

This revision of ANSI/UL 1419 dated July 30, 2021 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

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The requirements are substantially in accordance with Proposal(s) on this subject dated May 14, 2021.

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FEBRUARY 26, 2016
(Title Page Reprinted: July 30, 2021)



ANSI/UL 1419-2011 (R2021)

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UL 1419

Standard for Professional Video and Audio Equipment

First Edition – November, 1992
Second Edition – March, 1997
Third Edition – May, 2011

Fourth Edition

February 26, 2016

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through July 30, 2021.

The most recent designation of ANSI/UL 1419 as a Reaffirmed American National Standard (ANS) occurred on July 30, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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INTRODUCTION

1 Scope

1.1 These requirements cover video and audio equipment operated and maintained by trained personnel under the conditions of controlled access.

1.2 These requirements cover such equipment as video tape recorders, audio/video editing equipment, audio/video receiving and processing equipment, signal transmission equipment, television cameras, video digitizers, video monitors, metering equipment and similar equipment.

1.3 This Standard also covers auxiliary equipment and accessories which by themselves may not perform the desired function of the equipment outlined in [1.2](#) but are used in addition to or as a supplement to the basic equipment (remote controls, convertors, stands, etc.).

1.4 These requirements cover equipment rated 600 volts or less for use in accordance with the National Electrical Code, ANSI/NFPA 70.

1.5 Equipment employing circuits that are intended to connect directly to a telecommunications network also comply with the applicable requirements in the following relevant standards:

- a) Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1
- b) Standard for Audio, Video, and Similar Electronic Apparatus-Safety Requirements, UL 60065
- c) Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1

1.6 These requirements do not cover products that are intended for household or commercial use.

2 Glossary

2.1 For the purpose of this Standard the following definitions apply.

2.2 ACCESSIBLE PART – A part so located that it can be contacted by means of a probe (see [Figure 31.1](#)).

2.3 ADJUSTABLE CONTROL – A control provided for making adjustments necessary to render the equipment capable of performing its intended functions.

2.4 BRANCH CIRCUIT – A branch circuit is that portion of the building wiring system beyond the final overcurrent device on the power distribution panel protecting the circuit to the field wiring terminals in permanently connected equipment or to the receptacle outlet for cord connected equipment.

2.5 CART – A stand (see Personal Injury Tests, Section [58](#)) provided with casters, wheels, or rollers to make it mobile.

2.6 CASTER – Any roller or swiveled wheel attached to a cart, stand, or equipment that makes the cart, stand, or equipment mobile.

2.7 CLEARANCE DISTANCE – The shortest distance measured through air between conductive parts.

- 2.8 CREEPAGE DISTANCE – The shortage distance measured over the surface of insulation between conductive parts.
- 2.9 CORD-CONNECTED EQUIPMENT – Equipment intended to be connected to the branch circuit by means of a flexible cord.
- 2.10 FIBER – Where the term "fiber" is used in this standard to denote a material usually used as electrical insulation, vulcanized fiber is meant.
- 2.11 FIELD-WIRING TERMINAL – Any terminal to which a supply or other wire can be connected by an installer in the field is a field wiring terminal unless the wire is provided as part of the equipment and a connector, soldering lug, soldering loop, crimped eyelet, pressure terminal, or other means for making the connection is factory-assembled to the wire.
- 2.12 GROUND – Earth ground, unless otherwise specified.
- 2.13 HAND-HELD EQUIPMENT – Portable equipment that is held in one or both hands during normal use.
- 2.14 HANDLE – A part that is designed to be grasped by the hand or used by hand or machine for lifting or moving a product.
- 2.15 INTERLOCK – A mechanism that deenergizes parts involving a risk of electric shock or that stops moving parts before they become accessible to the user when the enclosure of the part is opened or a cover is removed.
- 2.16 LEAKAGE CURRENT – All currents, including capacitively coupled currents that flow through a person upon contact between accessible conductive surfaces of a product and ground or other accessible surfaces of a product.
- 2.17 MEASUREMENT INDICATION UNIT (MIU) – The output voltage across the meter in the measurement instrument in [Figure 41.2](#), in millivolts RMS, divided by 500 ohms. MIUs are related to physiological effects when electric current flows through the human body. At low frequency, the number of MIUs that is obtained by dividing the output voltage, in millivolts, by 500 ohms, equals the current, in milliamperes, through the measuring instrument. The reading may not be a direct indication of the RMS or other common amplitude quantifier of leakage current when the leakage current is of a complex waveform or frequency other than 50 or 60 Hz. At high frequency, the meter indication of MIUs is less than the number of milliamperes through the measuring instrument. For example, at 100 KHz, 0.5 MIU occurs when the actual current through the measuring instrument, shown in [Figure 41.2](#), is 70 mA. At any frequency, the acceptability of the leakage current can be determined by simply comparing the number of MIU's to the MIU limit.
- 2.18 MINOR DIMENSION OF OPENING – The minor dimension of an opening is the diameter of the largest sphere that can pass through the opening.
- 2.19 MULTIPLE (REDUNDANT) POWER SUPPLIES – Two or more power supplies, that are duplicates of each other, where one serves as a basic power source and the other(s) as back-up(s) should the basic power source become inoperative.
- 2.20 ORDINARY TOOLS – Flat-bladed and cross-head screwdrivers, nut drivers, and pliers.
- 2.21 PERMANENT OUTDOOR LOCATION – An unprotected location exposed to weather wherein the equipment is intended to be permanently installed and operated.

2.22 PORTABLE EQUIPMENT – Cord and plug connected equipment that weighs less than or equal to 18.2 kg (40 lb) and has no provision for permanent mounting and can be moved from one place to another without the use of carts or other assisting equipment.

2.23 POWER AMPLIFIERS – Equipment capable of sufficiently increasing the amplitude or power of a low level electric audio signal to drive a speaker. Equipment may be portable, rack mounted or permanently installed, with output terminals for connection to speaker loads, or with self contained speakers.

2.24 POWER-SUPPLY CORD – The cord provided to connect the equipment to the branch circuit.

2.25 PRIMARY CIRCUIT – Circuit that is conductively connected to the supply circuit.

2.26 PROBE – An instrument used to determine accessibility. See [Figure 31.1](#).

2.27 RACK-MOUNTED EQUIPMENT – Equipment that is provided with means for rack mounting.

2.28 SECONDARY CIRCUIT – Circuit that is conductively connected to the secondary winding of an isolating transformer.

2.29 UNINSULATED LIVE PART – A conductive part that involves a risk of fire or electric shock.

2.30 UNLIMITED POWER CIRCUIT – A circuit involving more than 240 W.

2.31 USER SERVICING – Servicing which can occur outside the enclosure in areas where uninsulated live parts are not accessible. See [33.1](#) for examples of user servicing.

3 Components

3.1 Except as indicated in [3.2](#) 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.

3.2 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.

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

3.4 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.

4 Units of Measurement

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

4.2 Unless indicated otherwise all voltage and current values mentioned in this Standard are root-mean-square (rms).

5 References

5.1 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.

CONSTRUCTION

6 General

6.1 Details

6.1.1 The construction of the equipment shall be such that:

- a) Intended use and user servicing does not result in a risk of fire, electric shock, or injury to persons;
- b) The materials and components are used within their electrical, mechanical, and temperature limits; and
- c) The assembly protects the components and wiring from being displaced or damaged.

6.1.2 The materials and components referred to in [6.1.1](#) and in other requirements are those involving a risk of fire, electric shock, or injury to persons and are so considered unless specifically indicated otherwise.

6.1.3 The equipment shall comply with either Option A (Construction) or Option B (Performance) indicated in [Table 6.1](#).

6.2 Systems

6.2.1 For a system that is comprised of two or more interconnected devices, each device may be evaluated to either Option A or Option B in [Table 6.1](#).

Table 6.1
Product evaluation options

Option	240 W determination ^{a,b,c}	Component Tests > 240 W Circuitry ^{a,b,d}	Table 7.1 ^b	7.3 – 7.7	Table 7.3 ^b
A (Construction)					
Primary	Yes	Yes	Yes	Yes	No
Secondary	No	No	Yes	Yes	No
Enclosure and other parts	N/A	N/A	Yes	Yes	No
B (Performance)					
Primary	Yes	Yes	No	No	Yes
Secondary	Yes	Yes	No	No	Yes
Enclosure and other parts	N/A	N/A	No	No	Yes

Table 6.1 Continued on Next Page

Table 6.1 Continued

Option	240 W determination ^{a,b,c}	Component Tests > 240 W Circuitry ^{a,b,d}	Table 7.1 ^b	7.3 – 7.7	Table 7.3 ^b
^a Does not apply to components and parts of Power Supplies that comply with applicable requirements in relevant UL Standards ⁱ such as UL 813, UL 1012, UL 1310, UL 60950-1, UL 60065, and UL 62368-1. ^b Does not apply to primary and secondary circuits supplied by a power supply as indicated in note (a) with a National Electrical Code Class 2 output. ^c Refer to Test for Limited-Power Circuit, Section 51 , for 240 W determination. ^d Refer to Power Supply Test, Section 53 and Component Abnormal Operation Test, Section 54 , for Component Testing. ⁱ Any power supply used shall be used in accordance with its Conditions of Acceptability.					

7 Frame and Enclosure

7.1 General

7.1.1 The enclosures, guards, and barriers of the equipment shall be complete, or completion of the enclosures, guards, and barriers shall be attained when the equipment is combined during installation.

7.1.2 Required enclosures, guards, and barriers shall be capable of being removed and replaced with a minimum of effort if removal is necessary for servicing the protected parts.

7.1.3 An enclosure, guard, and barrier shall have the strength and rigidity to resist the abuses likely to be encountered during intended use without increasing the risk of fire, electric shock, electrical energy-high current levels, or injury to persons due to total or partial collapse, with resulting reduction of spacings to less than required, or the loosening, displacement, or exposure of parts, or other serious defects.

7.1.4 The strength and rigidity of the enclosure is to be judged by the Strength of Enclosure Tests, Section [57](#).

7.1.5 A handle or handles intended to support hand carried or hand operated equipment shall be subjected to the Handle Strength Test as described in [58.4](#).

7.2 Doors or covers

7.2.1 If part of an enclosure consists of a door or cover leading to an operator access area, one of the following requirements shall apply:

- a) Either the door or cover shall be interlocked to comply with the requirements in [32.1](#); or
- b) The door or cover, although intended to be opened by the operator, shall comply with both the following conditions:
 - 1) It shall not be removable by the operator from the enclosure;
 - 2) It shall be provided with a means to keep it closed during normal operation.

7.3 External materials – Option A (Construction)

7.3.1 Materials such as steel, aluminum, glass, and other similar materials are to be used for the enclosure, guard, or cabinet of the equipment. Glass shall be heat resistant, tempered, wired, or laminated. Other materials may be used for part or all of an enclosure, if they comply with the requirements in the Standard for Polymeric Materials– Use in Electrical Equipment Evaluation, UL 746C.

The accessibility need not be investigated as part of the enclosure flammability – 130 mm (5-inch) Flame Test as required in UL 746C. See [Table 7.1](#).

Exception: The enclosure materials of portable equipment may be rated minimum V-2. See [Table 7.1](#)

Table 7.1
Material requirements – Option A

Application	Flammability ^{c,d}	Properties of material
Section		
A. Nonportable enclosures	b	b
B. Portable enclosure	V-2	–
C. Internal parts ^{e,g}	V-2	–
D. External Parts ^{e,f,g}	HB	–
<p>^a These requirements do not apply to the internal insulating systems of components or where component requirements exist.</p> <p>^b Must comply with flammability and properties of materials requirements in UL 746C except accessibility after flame test.</p> <p>^c The flammability classifications V-0, V-1, V-2, and HB are to be determined by the tests described in the Standard for Tests for Flammability of Plastic Material for Parts in Devices and Appliances, UL 94. For enclosures, a material classified using 3.2 mm thick bar specimens can be accepted in lesser thicknesses in the end product. For other parts, a material classified using 1.6 mm thick bar specimens can be accepted in lesser thicknesses in the end product.</p> <p>^d For an assembly, the test parameters according to Table 7.1 can consist of the assembly and can be tested as finished parts, or test assemblies can be cut from finished parts. In the case of small parts that might be consumed before the test is completed, large pieces of the same material can be tested provided that they represent the same or lesser thickness than the part in question. None of the larger pieces are to be entirely consumed. Test assemblies or a section thereof that are not flat stock pieces are to be positioned in what is considered to be the worst position in the application.</p> <p>^e The requirements that materials possess certain flammability classifications do not apply to small parts. For the purpose of these requirements, a small part is one which:</p> <ol style="list-style-type: none"> 1) The maximum dimension does not exceed 60 mm, and 2) The volume does not exceed 8000 mm³, and 3) Is located where it could not act as a bridge between a source of arcing or ignition and other ignitable parts. <p>^f Those parts outside required enclosure parts.</p> <p>^g Internal and external parts may consist of insulating materials, printed wiring boards, connectors, and the like.</p>		

7.4 Internal materials – Option A (Construction)

7.4.1 All combustible material used within a fire containment enclosure shall be rated in accordance with [Table 7.1](#).

7.4.2 All materials located in circuits not involving a risk of fire and segregated from parts involving a risk of fire by a barrier with a minimum flammability rating of V-2 may be rated minimum HB.

Exception: All materials located in an enclosure constructed of steel or aluminum, or material with a minimum 5V flammability rating and containing no openings may be rated HB without the use of a barrier.

7.4.3 Flammability requirements do not apply to polymeric materials, printed wiring boards and wiring within an enclosure having a volume of 0.06 m³ or less, consisting totally of metal and having no ventilation openings, or within a sealed unit containing an inert gas.