



UL 2930

STANDARD FOR SAFETY

Cord-and-Plug-Connected Health Care Facility Outlet Assemblies

UL Standard for Safety for Standard for Cord-and-Plug-Connected Health Care Facility Outlet Assemblies, UL 2930

First Edition, Dated August 11, 2023

Summary of Topics

The is the First edition of ANSI/UL 2930, Standard for Cord-and-Plug-Connected Health Care Facility Outlet Assemblies, dated August 11, 2023 and applies to indoor-use-cord-and-plug-connected health care facility receptacle outlet assemblies rated 250 V AC or less and 20 Amperes or less.

The new requirements are substantially in accordance with Proposal(s) on this subject dated May 12, 2023.

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UL 2930

Standard for Cord-and-Plug-Connected Health Care Facility Outlet

Assemblies

First Edition

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The most recent designation of ANSI/UL 2930 as an American National Standard (ANSI) occurred on August 11, 2023. 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 indoor-use cord-and-plug-connected Health Care Facility receptacle outlet assemblies (HCOA) rated 250 V AC or less and 20 Amperes or less. HCOA are for use as a movable power supply connection for cord-and-plug-connected medical electrical utilization equipment in accordance with the National Electrical Code, NFPA 70, Article 517 Health Care Facilities, and with NFPA 99, Health Care Facilities Code, for use in Category 2 (General Patient Care) Spaces or Category 1 (Critical Patient Care) Spaces, including Patient Care Vicinities equipped with Patient Equipment Grounding Points and an Attachment Plug with an Integral Patient Equipment Grounding Connection.

1.2 HCOAs are intended to supply cord-and-plug-connected medical equipment complying with applicable requirements of the:

- a) Standard for Medical Electrical Equipment, Part 1: General Requirements for Safety, UL 60601-1;
- b) Medical electrical equipment – Part 1: General requirements for basic safety and essential performance, IEC 60601-1; and
- c) Medical Electrical Equipment – Part 1-2: General Requirements for basic safety and essential performance – Collateral standard: Electromagnetic disturbances – Requirements and tests, AAMI 60601-1-2.

1.3 These requirements cover HCOA consisting of an NEMA WD 6-configuration Hospital Grade attachment plug and a length of non-detachable flexible cord terminated in an enclosure in which are mounted NEMA WD 6-configuration Hospital Grade individual receptacle outlets (duplex or single) which are connected conductively to an integral patient equipment grounding terminal or jack provided for user connection of a discrete patient equipment grounding conductor to Patient Equipment Grounding Points, installed in the Patient Care Vicinities of a Health Care Facility.

1.4 These requirements also cover an HCOA provided with an attachment plug with an integral patient equipment grounding connection. Once inserted into a duplex receptacle outlet, this equipment provides the Patient Equipment Grounding Point connection, in the Patient Care Vicinities of a Health Care Facility.

1.5 An HCOA is not intended for Home Health Care Use.

1.6 These requirements do not cover cord-connected, Relocatable Power Taps (RPT) intended only for indoor use as a temporary extension of a grounding alternating-current branch circuit for general use, covered by the Standard for Relocatable Power Taps, UL 1363. RPT are not suitable for use in Category 2 (General Patient Care) Spaces or Category 1 (Critical Patient Care) Spaces or Patient Care Vicinities.

1.7 These requirements do not cover cord-connected, Special Purpose Relocatable Power Taps (SPRPT); covered by the Outline of Investigation for Special Purpose Relocatable Power Taps, UL 1363A. SPRPT are power distribution components intended to supply power to plug-connected components of movable equipment assemblies that are rack, table, or pedestal-mounted. SPRPT are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The SPRPT shall be an integral part of the equipment assembly and permanently attached to the equipment assembly only by those qualified to assemble medical electrical equipment systems compliant with Medical electrical equipment – Part 1: General requirements for basic safety and essential performance, IEC 60601-1. SPRPT are not suitable for use in Patient Care Vicinities.

1.8 These requirements do not cover cord-connected, Furniture Power Distribution Units (FPDU), intended for indoor use that provide power for and are intended to be installed in furnishings. FPDU are covered by the Standard for Furniture Power Distribution Units, UL 962A.

2 Use

2.1 A HCOA is intended to be connected temporarily to a permanently-installed branch circuit Hospital Grade receptacle outlet and, where the health care facility's governing body has determined that use of Patient Equipment Grounding Points are essential in Patient Care Vicinities, to patient equipment grounding points permanently installed in the patient care spaces of a Health Care Facility.

2.2 A HCOA is intended for cord-and-plug connection of medical utilization equipment that has been authorized by the Health Care Facility in which the HCOA is deployed and the medical utilization equipment has been verified as having touch and leakage current suitably low for patient care use.

2.3 A HCOA is intended to be mounted to benches, stands, carts, or other areas containing multiple cord-and-plug-connected medical electrical utilization equipment that is intended and authorized for use in that patient care use location.

2.4 A HCOA is not intended to be series-connected ("daisy chained") to:

- a) Other HCOA's;
- b) Relocatable Power Taps;
- c) Furniture Power Distribution Units, or;
- d) Extension cords.

A HCOA is not intended to be connected via a grounding adapter or via a current tap to a receptacle outlet.

2.5 A HCOA is not intended to be placed directly upon the floor of a patient care space.

2.6 A HCOA is not intended to be used within Hazardous (Classified) Anesthetizing Locations or any other Hazardous (Classified) Locations as defined by NFPA 70.

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.

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

5 Referenced Publications

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.

5.2 The following publications are reference in this Standard:

AAMI 60601-1-2, *Medical Electrical Equipment – Part 1-2: General Requirements for Basic Safety and Essential Performance – Collateral Standard: Electromagnetic Disturbances – Requirements and Tests*

ASTM E230/E230M, *Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples*

IEC 60601-1, *Medical Electrical Equipment – Part 1: General Requirements for Basic Safety and Essential Performance*

NFPA 70, *National Electrical Code*

NFPA 99, *Health Care Facilities Code, for use in Category 2 (General Patient Care) Spaces or Category 1 (Critical Patient Care) Spaces, including Patient Care Vicinities equipped with Patient Equipment Grounding Points and an Attachment Plug with an Integral Patient Equipment Grounding Connection*

UL 94, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 498, *Attachment Plugs and Receptacles*

UL 514A, *Metallic Outlet Boxes*

UL 746C, *Polymeric Materials – Use in Electrical Equipment Evaluations*

UL 796, *Printed-Wiring Boards*

UL 817, *Cord Sets and Power-Supply Cords*

UL 962A, *Furniture Power Distribution Units*

UL 969, *Marking and Labeling Systems*

UL 1283, *Electromagnetic Interference Filters*

UL 1310, *Class 2 Power Units*

UL 1363, *Relocatable Power Taps*

UL 1363A, *Outline of Investigation for Special Purpose Relocatable Power Taps*

UL 1449, *Surge Protective Devices*

UL 60384-14, *Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains*

UL 60601-1, *Medical Electrical Equipment, Part 1: General Requirements*

6 Glossary

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

6.2 ANESTHETIZING LOCATION – Any area of a facility that has been designated to be used for the administration of any flammable or nonflammable inhalation anesthetic agent in the course of examination or treatment, including the use of such agents for relative analgesia.

6.3 ATTACHMENT PLUG – A male contact device for the temporary connection of a flexible cord or cable to a receptacle outlet or cord connector.

6.4 ATTACHMENT PLUG WITH INTEGRAL PATIENT EQUIPMENT GROUNDING CONNECTION – Same as an attachment plug except employs an additional grounding pin and conductor. The additional grounding pin and conductor is independent and separate from the branch-circuit grounding pin and conductors. This additional grounding pin and conductor serves as an internal connection forming the Patient Equipment Grounding Point connection when inserted into an NEMA WD6 duplex receptacle only, installed in a patient care space of a Health Care Facility.

6.5 CURRENT TAP FITTING – An attachment plug with a pass-through outlet located within the body of the attachment plug. Not permitted in any HOCA device.

6.6 HEALTH CARE FACILITY OUTLET ASSEMBLY (HCOA) – A metallic electrical enclosure provided with an attached power supply cord, attachment plug for connection to a permanently installed branch circuit receptacle outlet and provided with either a patient equipment grounding terminal or jack for connection to a permanently installed Patient Equipment Grounding Point or an attachment plug with integral patient equipment grounding connection. The electrical enclosure may be provided with one to six individual receptacle outlets (duplex or single). The HCOA may also be provided in any combination of the following configurations:

- a) Provided with indicator lights.
- b) Provided with a surge protective device (SPD) that complies with [10.2](#).
- c) Provided with an electromagnetic interference (EMI) filter that complies with the requirements of [10.1](#).

6.7 HEALTH CARE FACILITY'S GOVERNING BODY – The person or persons who have the overall legal responsibility for the operation of a health care facility, including risk assessment policies, resources, and risk management processes, building components (such as the availability and function of a patient equipment grounding terminal).

6.8 MEANS FOR MOUNTING – A method of securement of the HCOA to another object.

6.9 NOMINAL DISCHARGE CURRENT (I_n) – Peak value of the current, selected by the manufacturer, through a Surge Protective Device (SPD) having a current wave shape of 8/20 where the SPD remains functional after 15 surges.

6.10 PATIENT CARE VICINITY – A Health Care Facility space, within a location intended for the examination and treatment of patients, extending 6 ft (1.8 m) beyond the normal location of the patient bed, chair, table, treadmill, or other device that supports the patient during examination and treatment, and extending vertically to 7 ft 6 in. (2.3 m) above the floor.

6.11 PATIENT EQUIPMENT GROUNDING CONDUCTOR – A user-connected insulated conductor, other than supplied in the power supply cord, to provide a return grounding path connection from the mounting yokes of Hospital Grade receptacles of the HCOA and also from the unenergized accessible metal parts of the HCOA to a permanently-installed Patient Equipment Grounding Point of the Health Care Facility.

6.12 PATIENT EQUIPMENT GROUNDING CONDUCTOR INTEGRAL – An additional insulated conductor, supplied within the power supply cord, connected to an attachment plug with an additional grounding pin, to provide a return grounding path connection from the mounting yoke of Hospital Grade receptacle of the HCOA and also from the unenergized accessible metal parts of the HCOA to a permanently-installed Patient Equipment Grounding Point of a Health Care Facility.

6.13 PATIENT EQUIPMENT GROUNDING POINT – A Health Care Facility terminal or jack that serves as the collection point for return grounding of electrical appliances serving a patient care vicinity or for grounding other items in order to eliminate electromagnetic interference problems.

6.14 PATIENT EQUIPMENT GROUNDING TERMINAL – A terminal or jack bonded to the HCOA enclosure and conductively connected to the mounting yokes of Hospital Grade receptacles of the HCOA for user-connection of a patient equipment grounding conductor provided as a return ground path to the permanently-installed patient equipment grounding point of the Health Care Facility.

6.15 RECEPTACLE OUTLET – A female contact device mounted within an electrical enclosure to allow a detachable electrical connection of an attachment plug. A duplex receptacle consists of two female contact devices on the same receptacle yoke and is considered to be two receptacle outlets for the purpose of requirements in this standard.

6.16 SUPPLEMENTARY PROTECTOR DEVICE – A device intended for use as overcurrent, over- or under-voltage, or over-temperature protection within electrical equipment where branch circuit overcurrent protection is already provided.

6.17 8/20 CURRENT WAVE – Current surge with a virtual front time of 8 μ s and a time to half-value of 20 μ s delivered into a short circuit.

CONSTRUCTION

7 General

7.1 A HCOA that has an electromagnetic interference filter shall also comply with applicable requirements for cord-connected EMI Filters in the Standard for Electromagnetic Interference Filters, UL 1283. Electromagnetic Interference Filters used in HCOA shall not be connected to either the equipment grounding conductor or the patient equipment grounding terminal (i.e. No L-G or N-G connection mode).

7.2 A HCOA employing surge protective components shall also comply with the applicable requirements for cord-connected, Type 3 Surge Protective Device (SPD) in UL 1449. The allowable leakage current or touch current shall not exceed 0.1 mA.

7.3 A HCOA employing surge protective components shall also comply with a minimum 3 kA Nominal Discharge Current Rating In when tested in accordance with UL 1449.

7.4 Component Surge Protective devices installed in a HCOA shall only be connected between the ungrounded (line) and grounded (neutral) conductors. Component Surge Protective devices shall not be connected between the ungrounded (line) conductor and the grounding conductor (patient equipment ground), nor between the grounded (neutral) conductor and the grounding conductor (patient equipment ground).

7.5 A HCOA shall not have either a manual or automatic switch that disconnects power from any of the HCOA receptacle outlets.

7.6 A HCOA shall not be provided with any supplementary protection device that disconnects power from any of the HCOA receptacle outlets.

7.7 A HCOA shall not be provided with any Circuit-Interrupter device that disconnects power from any receptacle outlet. Examples of circuit interrupter devices include but are not limited to:

- a) Ground-Fault Circuit Interrupters (GFCI);
- b) Appliance Leakage-Current Interrupters (ALCI);
- c) Arc-Fault Circuit Interrupters (AFCI); and
- d) Equipment Leakage-Current Interrupters (ELCI).

7.8 A HCOA that is provided with an integral power supply with one or more Class 2 output connectors shall comply with the applicable requirements of UL 1310. A HCOA that employs receptacles provided with an integral power supply with Class 2 output connectors shall comply with the applicable requirements in Supplements SC and SE of UL 498. Where provided, the Class 2 output connectors shall be investigated to the Leakage Current Test, Section [27](#), and comply with its leakage current limits.

7.9 An HCOA shall not be provided with a current tap fitting.

8 Enclosures

8.1 General

8.1.1 The enclosure shall be formed of metal only and assembled so that it has the strength and rigidity required to resist the abuses to which it is subjected, without resulting in a risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts or other serious defects. See the Enclosure Integrity Test, Section [35](#). See Sections [31](#) – [37](#).

8.1.2 The enclosure shall not have any openings or knockouts that are capable of being used for connection to a permanent wiring system.

8.1.3 A keyhole slot, notch, or similar means for mounting shall be located and configured so that the supporting screws or the like cannot damage any electrical insulation, reduce spacings to live parts, or permit fluid to enter the enclosure of an HCOA.

8.1.4 A barrier that covers a mounting hole and thereby forms part of the required enclosure shall be subjected to the Mounting Hole Barrier Tests, Section [31](#).

8.1.5 Enclosure parts shall be secured together by a positive means. Press fit alone is not considered a positive means of securement.

8.1.6 The enclosure shall be provided with a means for mounting. The mounting means shall comply with Mounting Means, Section [11](#).

8.2 Metallic

8.2.1 A HCOA shall have a metal enclosure with a minimum thickness in accordance with [Table 8.1](#).

Table 8.1
Minimum Thicknesses of Enclosure Metal

Metal	At small, flat unreinforced surfaces and at surfaces of a shape or size to provide adequate mechanical strength		At relatively larger unreinforced flat surfaces	
	in	(mm)	in	(mm)
Die-cast metal	3/64	(1.2)	5/64	(2.0)
Cast malleable iron	1/16	(1.6)	3/32	(2.4)
Other cast metal	3/32	(2.4)	1/8	(3.2)
Uncoated sheet steel	0.026	(0.66)	0.026	(0.66)
Galvanized sheet steel	0.029	(0.74)	0.029	(0.74)
Nonferrous sheet metal	0.036	(0.91)	0.036	(0.91)

9 Mechanical Assembly

9.1 A HCOA shall be formed and assembled so as to reduce the risk of contact with any sharp edges, fins, burrs or the like that are capable of increasing the risk of injury to persons or causing abrasion of the insulation on conductors.

9.2 A lampholder, power-supply cord and its strain-relief bushing, receptacle, or similar component shall be mounted securely and, except as noted in [9.3](#), shall be restrained from turning. See [9.4](#).

9.3 A lampholder of a type in which the lamp is not intended to be replaced, such as a neon pilot or an LED indicator light in which the lamp is sealed, is not required to be restrained from turning where the rotation is not capable of reducing spacings below the minimum acceptable values.

9.4 The means by which the turning specified in [9.2](#) is prevented is to include more than friction between surfaces. For example, a lock washer, properly applied, is not prohibited from being used as a means to restrain turning of a device having a single-hole mounting means.

10 Accessibility of Live Parts

10.1 The electrical parts of a HCOA that do not require use of a tool for access shall be located or enclosed so that persons are protected against inadvertent contact with uninsulated live parts and film-coated magnet wire.

10.2 An opening in the enclosure of a HCOA is not prohibited where an uninsulated live part or film-coated magnet wire is not capable of being contacted by the probe shown in [Figure 10.1](#). The probe shall