OREGON FIRE CODE

Interpretations and Technical Advisories

A collaborative service by local and state fire professionals, along with our stakeholders and customers, to provide consistent and concise application of Oregon's fire prevention and life safety regulations.

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Initiating: Technical Advisory No. 17-01
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Subject: Multiplug Adapters and Power Strips - UL 1363 Relocatable Power Taps (RPTs), UL 1449 Surge Protective Devices (SPDs), UL 1363A Special Purpose Relocatable Power Taps (SPRPTs), UL 60601-1 Medical Electrical Equipment, and UL 2930 Healthcare Outlet Assemblies (HCOA)

Code References: 2014 Oregon Fire Code (OFC), Section 605.4; 2012 National Fire Protection Association (NFPA) 99 Health Care Facility Code; 2014 NFPA 70, National Electrical Code;

Section I:

FAQs

Question No. 1: Are the use of **multiplug adapters** permitted as a way of providing multiple electrical outlets or outlet configurations within a building?

Answer: No, not in buildings regulated under the 2014 Oregon Fire Code (OFC). The intent of Section 605.4 OFC, is to prohibit conditions that could lead to the overloading of building electrical circuits that, in turn, could result in a fire. When multiplug adaptors (technically called Current Taps) are used for several appliances, such devices may produce enough heat to ignite nearby combustibles in the time it takes to trip the overcurrent protection device. Simultaneous operation of many small loads may cause dangerous localized resistance heating, without tripping the overcurrent protection device. Multiplug adapters are intended for temporary use only, not at a fixed location, or in place of wiring complying with the National Electrical Code, NFPA 70. The fire code does allow for the use of *listed*, **Relocatable Power Taps** (RPTs) complying with specific criteria mentioned in Sections 605.4.1 through 605.4.3 OFC.

Question No. 2: Are **power strips** permitted as a way of providing multiple electrical outlets or outlet configurations within a building?

Answer: Yes. Sections 605.4.1 through 605.4.3, 2014 Oregon Fire Code, provides basic requirements for a specific type of power strip, referred to as a **Relocatable Power Tap** (RPT). RPTs are to be *listed* by a Nationally Recognized Testing Laboratory (NRTL) in order to meet nationally recognized standards for safety. Underwriters Laboratories (UL) is one such NRTL that authors many product safety standards. The specific listing criteria for RPTs can be found in document standard UL 1363.

It is important to understand that there is not a single type of power strip that is suitable for every application in a building. Each category of power strip has a specific purpose, and should not be used for a different purpose that it is not designed and approved for.

Figure 1 below shows a brief summary for intended use, application, and mounting method for the different UL listed power strips.

Figure 1 - Brief Power Strip Summary

Devices rated 250 V AC or less and 20 Amperes or less

Power Strips	Intended Design Use	Application Area	Mounting Method
UL 1363 (RPTs)	High concentration of low-power loads for electronic devices in most occupancies	Not classified for patient care spaces	Shall NOT be permanently attached (removable without a tool)
UL 1363A (SPRPTs)	Health Care Moveable Equipment (i.e., IV poles and crash carts)	Intended for Medical Equipment Patient/Critical Patient Care Spaces	Requires permanent mounting to mobile medical equipment (a tool must be used)
UL 60601-1	Health Care	Patient/Critical Patient Care Spaces	Shall be permanently attached
UL 2930 (HCOAs)	Health Care	Patient/Critical Patient Care Spaces	Shall be permanently attached

Acceptable Use of Relocatable Power Taps.

The development of **Relocatable Power Taps** (RPTs) and a similar looking device, the surge protector device (SPD), took place around the dawn of the computer age. RPTs were originally designed for connecting computers and their multiple accessories, all relatively low power draws. The most common type has six outlets, an on/off switch, and an internal circuit breaker that is designed to trip at either 15 or 20 amps. RPTs must be plugged directly into wall receptacles, and may be temporarily mounted such that a tool is not required for removal. RPTs must be a UL (or other NRTL) approved device. These devices are not meant to be a replacement or extension of premises wiring. These devices are not designed for high-powered loads such as space heaters, refrigerators and microwave ovens, which can easily exceed the recommended ampere ratings on many power strips.

Underwriters Laboratories (UL), refers to power strips as RPTs and describes them as "relocatable multiple outlet extensions of a branch circuit to supply laboratory equipment, home workshops, home movie lighting controls, musical instrumentation, and to provide outlet receptacles for computers, audio and video equipment and other equipment."

Power strips may contain other electronic components intended to provide electrical noise filtering or surge protection. UL defines and lists such devices in UL 1283, Standard for Electromagnetic Interference Filters and 2.) UL 1449, Surge Protective Devices (SPDs) Type 3 – Point of utilization SPDs. **SPDs are dual-listed by UL and meet the requirements of UL 1363 for Relocatable Power Taps.**

Section II:

Description of Available Devices

We have provided brief outlines of the listing criteria by group and category in order to clarify the use and application of power strip devices. For a complete description of the five (5) devices and their listings, please review the specific referenced UL standard listing.

1.) UL 1363 – Relocatable Power Taps (RPTs)

Relocatable Power Taps (RPTs) and surge protector devices (SPDs) are designed for "general use" plug and receptacle devices with a high concentration of low-power loads such as computers, audio and video equipment, phones, musical instruments, home movie lighting, home workshops, and laboratory equipment. They are not intended for use with high-amperage loads, such as refrigerators, coffee pots, space heaters, microwave ovens, toaster ovens, air conditioners, and fans - that are likely to overload the device. As a general rule, anything with an electric motor, and a pulley and belt, should not be plugged into a UL 1363 RPT.

Relocatable power taps and transient voltage surge protector devices are not extension cords. RPTs and SPDs are not considered temporary wiring. Although one of the alternative names for the RPT is a temporary power tap, the temporary refers to the physical mounting of the device and expected life cycle of the device. **RPTs and SPDs are:**

- Intended for indoor use to supply power to cord-and plug-connected electrical utilization equipment
- Rated 250 V AC or less and 20 Amperes or less
- May be provided with fuses or other supplementary overcurrent protection, switches, suppression components, and/or indicator lights
- **Shall be** equipped with overcurrent protection to be in conformance with the OFC
- The cord must have a grounding pin (3-prong-plug) or be polarized (one blade is wider than the other). The length of the listed cord can range from 1.5 ft up to 30 ft
- Intended to be directly connected to a permanently installed branch-circuit receptacle (outlet)
- **NOT** intended to be series connected (daisy chained) to other relocatable power taps or to extension cords
- **NOT** intended to be permanently secured to building structures, tables, work benches or similar structures, nor are they intended to be used as a substitute for fixed building wiring
- Can employ a mounting means that **does not** require the use of tools for mounting or dismounting, and conceals the head of a screw or other fastener, so that it cannot be tightened after mounting. It shall not be located or positioned on the floor
- Cords are not intended to be routed through walls, windows, ceilings, floors or similar openings of buildings
- The leakage current shall not be more than 0.5 milliamperes (mA) *(Leakage currents refer to all currents that may be conveyed between exposed conductive surfaces of the product and ground)*
- Cannot be used in the "Patient Care Vicinity"
- May include hospital-grade plug and receptacles (outlets)

UL 1363 RPTs have not been investigated and **are not intended for use with General Patient Care (Category 2) Spaces or Critical Patient Care (Category 1) Spaces of health care facilities.** *Business offices, corridors, lounges, day rooms, dining rooms, or similar areas typically are not classified as patient care spaces.*

There are UL 1363 RPTs with "hospital-grade" plugs and receptacles. In addition to complying with the general use plug and receptacle requirements of UL 1363, hospital-grade plugs and receptacles have additional features and performance requirements for improving grounding reliability, assembly integrity, strength, and durability. Today, these hospital-grade UL 1363 devices may be used in Operating Rooms with "Isolation Power Systems," but cannot be used in the "Patient Care Vicinity."

An "isolation power system" provides an ungrounded electrical service for various applications within a hospital or a medical office building. These isolation power systems remain in operation in the event of a single line-to-ground fault situation. These systems also eliminate the danger of an electric shock to patients who may be more susceptible to leakage current and unable to move in their beds.

If there is a fault, the system alarm in the isolation panel activates. When the alarm is activated, the critical medical equipment remains operational, because no ground fault protection or overcurrent protective device trips. The triggering of an alarm from a single ground fault must be rectified as soon as possible at a "safe" time, as a second ground fault could trigger the short circuit protection and take an entire operating room offline.

2.) UL 1449 – Surge Protective Devices (SPDs) Type 3 – Point of utilization SPDs

A surge protective device (SPD) is a protective device for limiting transient voltages by diverting or limiting surge current and is capable of repeating these functions as specified. SPDs were previously known as Transient Voltage Surge Suppressors (TVSS) or secondary surge arrestors (SSA). An SPD can look like an RPT, and its function gives the user the ability to plug in multiple electronic devices, but it also serves another very important function. An SPD will also protect your electronic devices from a power spike. *(A power spike is a temporary, very high increase in power that lasts for a fraction of a second).*

- UL 1449 listing criteria covers cord-connected direct plug-in and permanently connected SPDs intended for indoor and outdoor use in accordance with the National Electrical Code, NFPA 70

The surge protection function and listing of compliance with UL 1449 may be incorporated into any UL 1363 RPT, UL 1363A SPRPT, UL 60601-1, or UL 2930 HCOA device.

Power Strips Listed for Health Care Facilities

Figure 2 - Summary for Health Care Facilities

Devices rated 250 V AC or less and 20 Amperes or less

Location	UL Listing	Listed for Use In
Administrative/Business Areas	UL 1363 (RPTs)	High concentration of low-power loads for electronic devices outside the patient care vicinity
Operating Areas w/ Isolation Power System	UL 1363 (RPTs)	With hospital-grade plug and outlets, NOT approved for use in patient care vicinity
Mobile Application	UL 1363A (SPRPTs)	For use inside and outside patient care areas. Shall be permanently mounted
General Patient Care Spaces or Critical Patient Care Spaces	UL 60601-1	Hospital-grade, outlets accessible w/ tool, limited to 4 outlets when mobile, with or without surge protection
General Patient Care Spaces or Critical Patient Care	UL 2960 (HCOAs)	Hospital-grade plug and outlets, with or without surge protection. Grounded points.

Spaces		

3.) UL 1363A – Special Purpose Relocatable Power Taps (SPRPTs)

Medical-grade RPTs meeting UL 1363A can be used inside and outside the "Patient Care Vicinity." Must comply with all the requirements for UL 1363 - Relocatable Power Taps (RPTs) except as modified below:

- Intended for use with medical equipment and intended to be used in **Category 2 (General Patient Care Spaces) or Category 1 (Critical Patient Care Spaces)**
- Can be used inside or outside the "Patient Care Vicinity"
- Requires dual breakers
- Supply power to plug-connected components of movable equipment assemblies that are rack-, table-, or pedestal- mounted medical equipment
- **Shall be** permanently mounted to the mobile medical equipment (i.e., IV poles and crash carts) by a means such that it is only removable with the use of a tool; it shall not be located or positioned on the floor
- **Shall be** provided with hospital-grade attachment plugs and receptacles (outlets)
- The sum of the ampacity of all appliances connected to the SPRPT shall not exceed 75 percent of the ampacity of the flexible cord supplying the power to the SPRPT receptacles (outlets)
- **Shall** comply with certain construction and performance requirements in the Standard for Medical Electrical Equipment, Part 1: General Requirements for Safety, UL 60601-1
- Enclosure leakage current, under normal conditions, must not exceed 0.1 milliamperes (mA)

4.) UL 60601-1 – Medical Electrical Equipment, Part 1: General Requirements for Safety

Medical-grade RPTs meeting UL 60601-1 can be used inside and outside the "Patient Care Vicinity." This current UL 60601-1 listing is scheduled to be replaced with a new UL 2930 – Outline of Investigation for Cord-and-Plug-Connected Health Care Facility Outlet Assemblies (HCOAs)

- Essentially the same electrical performance requirements specified in UL 1363A, but is listed for use as a finished product
- Mains terminal receptacles (outlets) shall not be accessible without the use of a tool, even if their live parts are not accessible
- If mounted on emergency trolleys (i.e., IV poles), must limit the number of outlets to 4

5.) New UL 2930 – Outline of Investigation for Cord-and-Plug-Connected Health Care Facility Outlet Assemblies (HCOAs)

- New UL Outline of Investigation intended to replace listing to UL 60601-1
- Similar to requirements outlined in UL 60601-1 and 1363A
- Indoor-use rated 250 V AC or less and 20 Amperes or less
- Intended for use with equipment complying with applicable requirements of the:
  - UL 60601-1 Standard for Medical Electrical Equipment, Part 1: General Requirements, UL 60601-1;
  - IEC 60601-1 Medical Electrical Equipment – Part 1: General requirements for basic safety and essential performance, and
  - ANSI/AAMI 60601-2 Medical Electrical Equipment – Part 1-2: General Requirements for Basic Safety and Essential Performance – Collateral Standard: Electromagnetic Disturbances Requirements and Tests
- Can be used inside or outside the "Patient Care Vicinity"

- For use as a movable power supply connection for cord-and plug-connected medical electrical utilization equipment in accordance with NFPA 70, Article 517 Health Care Facilities, and with NFPA 99 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**
- HCOAs shall not be provided with any supplementary protection device that disconnects power from any of the HCOA receptacle outlets
- HCOAs shall not have either a manual or automatic switch that disconnects power from any of the HCOA receptacle outlets

Section III:

Key Definitions

UL Listing means that UL has tested representative samples of a product and determined that it meets UL's requirements. These requirements are often based on UL's published and nationally recognized Standards for Safety.

Patient Care Spaces. Any space of a health care facility wherein patients are intended to be examined or treated. See categories 1 through 4 below. *Note: Business offices, corridors, lounges, day rooms, dining rooms, or similar areas typically **are not** classified as patient care spaces.*

Category 1 Space. Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors.

*These spaces, formerly known as **critical care rooms**, are typically where patients are intended to be subjected to invasive procedures and connected to line operated, patient care–related appliances. Examples include, but are not limited to, special care patient rooms used for critical care, intensive care, and special care treatment rooms such as angiography laboratories, cardiac catheterization laboratories, delivery rooms, operating rooms, post-anesthesia care units, trauma rooms, and other similar rooms.*

Category 2 Space. Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors.

*These spaces were formerly known as **general care rooms**. Examples include, but are not limited to, inpatient bedrooms, dialysis rooms, in vitro fertilization rooms, procedural rooms, and similar rooms.*

Category 3 Space. Space in which the failure of equipment or a system is not likely to cause injury to patients, staff, or visitors but can cause discomfort.

*These spaces, formerly known as **basic care rooms**, are typically where basic medical or dental care, treatment, or examinations are performed. Examples include, but are not limited to, examination or treatment rooms in clinics, medical and dental offices, nursing homes, and limited care facilities.*

Category 4 Space. Space in which failure of equipment or a system is not likely to have a physical impact on patient care.

*These spaces were formerly known as **support rooms**. Examples of support spaces include, but are not limited to, anesthesia work rooms, sterile supply, laboratories, morgues, waiting rooms, utility rooms, and lounges.*

Patient Care Vicinity. A space, within a location intended for the examination and treatment of patients, extending 6 feet beyond the normal location of the bed, chair, table, treadmill, or other device that supports the patient during examination and treatment and extending vertically to 7 feet, 6 inches above the floor. UL 1363 Medical-grade relocatable power taps are not intended for patient care vicinity.

Section IV:

Narrative of Model Code Requirements:

2014 Oregon Fire Code, Sections 605.4.1, 2 & 3

- RPTs shall be polarized or grounded type, equipped with overcurrent protection and listed per UL 1363
- RPT's rated 250 V AC or less and 20 Amperes or less
- Shall be connected directly to a permanently installed receptacle
- Shall not extend through walls, ceilings, under doors or floors coverings, or be subject to environmental or physical damage

2012 NFPA 99, Health Care Facilities Code, Chapter 10 Electrical Equipment

- RPTs are referred to as multiple outlet connections
- They are permitted to be used in conjunction with patient care-related electrical equipment provided that the equipment is a movable equipment assembly
    - Receptacles must be permanently attached to the equipment assembly
    - The sum of ampacity of all appliances connected to the outlets does not exceed 75 percent of the ampacity of the flexible cord supplying the outlets
    - The ampacity of the flexible cord is in compliance with NFPA 70
    - Means are employed to ensure that additional devices or nonmedical equipment cannot be connected to the multiple outlet extension cord after leakage currents have been verified as unsafe
    - The requirements only apply to the use of RPTs in conjunction with patient care-related electrical equipment
    - NFPA 99 **does not** specify the requirements based on patient care areas, non-patient care areas or any other designation
    - NFPA 99 **does not** prohibit or explicitly allow the use of RPTs in other areas or for other purposes

2014 NPFA 70 National Electrical Code, Article 400

- Provides guidance on use of flexible cords
- Prohibit use of flexible cords in many of the same areas as UL product safety standard:
    - Cannot be used as substitutes for the fixed wiring of a structure
    - Cannot be run through holes in walls, structural ceilings, suspended or dropped ceilings, or floors
    - Cannot be run through doorways, windows, or similar openings
    - Cannot be attached to building surfaces

2014 NPFA 70 National Electrical Code, Article 517

- Specifies the types of receptacles to be used in patient care areas

- Requires the use of listed equipment in patient care vicinity

2012 NFPA 101 and NFPA 99 (Adopted by Centers for Medicare & Medicaid Services (CMS)

- Hospitals must have the minimum number of outlets required by NFPA 99
- RPTs for patient care-related equipment are allowed in the patient care vicinity if requirements in NFPA 99 10.2.3.6 are met
- RPTs in the patient care vicinity are not allowed to power non-patient care related equipment
- RPTs are allowed outside of the patient care vicinity for both patient and non-patient care-related equipment
- RPTs for patient care-related equipment do not have to be an integral component of manufactured equipment and may be permanently attached by qualified personnel
- RPTs used for patient care-related equipment must be listed SPRPTs
- RPTs for non-patient care-related equipment must be listed RPTs

Section V:

Common Violations Surrounding Relocatable Power Taps (RPTs)

Daisy-Chaining: Interconnecting RPTs violates the UL 1363 listing, manufacturer's recommendations, the National Electrical Code (NEC), and Occupational Safety and Health Administration (OSHA) regulations because it can cause overloads and fires. Extension cords also fall under this category. **There is no provision for using an extension cord in a healthcare environment.**

Improper Routing: Routing cords through walls, ceilings, floors, windows or similar openings is similarly prohibited as noted above.

Overloading: RPTs are designed to be used with several low-amperage loads, such as desktop computers and peripherals. Power strips must not be connected to high-amperage loads, such as refrigerators, space heaters, microwave ovens or air conditioners that are likely to overload the device.

Improper Mounting: RPTs must not be mounted with Velcro®, double-sided tape, duct tape, zip ties, etc.

Improper Plug Connection: The RPT must not be suspended from the power cord.

Signs of Thermal Distress: RPT plugs or cords that are hot to the touch, melted, burned, frayed, scorched or discolored are signs of failure and shall be removed.

Signs of Damage or Neglect: RPT cords and components should not be dirty, stained, crushed, cut, broken, kinked, warped, knotted, twisted, loose, frayed or otherwise damaged.

Improper Environmental Conditions: The RPT must not be installed in a moist environment or a location with excessive heat or limited air circulation.

Improper Grounding: The RPT must not have its grounding pin/wire removed or connected to an adapter that defeats grounding.

Tripping Hazards: The RPT must not be installed in a location where it may impede the safe movement of people, patients, and staff.

Improper Application: RPTs must be used for the applications they are designed and approved for. For example, a RPT with a UL 1363 listing and hospital-grade plug and receptacles can be used in some areas of a healthcare facility, but it cannot be used in the Patient Care Vicinity.

Section VI:

Figure 3 – Comparison Chart

Devices rated 250 V AC or less and 20 Amperes or less

Intended Use		Application Area	Mounting Method
UL 1363 (RPTs)	Indoor use as an extension of a grounded alternating current (AC) branch circuit for general purpose	High concentration of low-power loads for electronic devices in most occupancies	NOT permanently secured to building structures, tables, work benches or similar structures
UL 1363 (RPTs) w/ hospital-grade plug and outlets	Same as above and intended for operating rooms with isolation power system. These isolation power systems remain in operation in the event of a single line-to-ground fault situation	Same as above and for operating rooms with hospital-grade plug and outlets. **Cannot** be used in the patient care vicinity	NOT permanently secured to building structures, tables, work benches or similar structures
UL 1443 (SPDs) Type 3	Indoor use as an extension of a grounded alternating current (AC) branch circuit for general purpose	Administrative and business areas outside the patient care vicinity. Used in health care applications when listed with UL 2930	NOT permanently secured to building structures, tables, work benches or similar structures
UL 1363A (SPRPTs)	Supply power to plug-connected components of movable equipment assemblies that are rack-, table-, or pedestal-mounted	Intended for use with medical equipment and intended to be used in General Patient Care Areas or Critical Patient Care Areas. Shall be provided with Hospital Grade attachment plugs and outlets.	Shall be permanently attached to the medical equipment by a means such that it is only removable with the use of a tool
UL 60601-1	Essentially the same electrical performance requirements specified in UL 1363A, but is Listed for use as a finished product	Mains terminal devices (outlets) shall not be accessible without the use of a tool, even if their live parts are not accessible	If mounted on emergency trolleys, must limit the number of outlets to 4
UL 2930 (HCOAs)	Similar to requirements outlined in UL 60601-1 and 1363A	For use as a movable power supply connection for cord- and plug-connected medical electrical utilization equipment in accordance with NFPA 70, Article 517 Health Care Facilities, and with NFPA 99 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**	Shall be permanently attached to the medical equipment by a means such that it is only removable with the use of a tool

Contacts: If you have questions or are in need of further information, contact David Mills at 503-934-8204, david.mills@state.or.us

References:

2014 OFC Sections:

Oregon Revised Statute:

Oregon Administrative Rule:

Imbedded links:

http://www.