



# UL 1678

## STANDARD FOR SAFETY

Household, Commercial, and Institutional-Use  
Carts, Stands and Entertainment Centers for Use  
with Audio and/or Video Equipment

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UL Standard for Safety for Household, Commercial, and Institutional-Use Carts, Stands and Entertainment Centers for Use with Audio and/or Video Equipment, UL 1678

Fifth Edition, Dated August 10, 2012

### **SUMMARY OF TOPICS**

***This new edition of ANSI/UL 1678 is being issued to incorporate the requirements of the Standard for Tall Institutional Carts for Use with Audio-, Video-, and Television-Type Equipment, UL 1667, and to address flat panel video display technology.***

The new/revised requirements are substantially in accordance with Proposal(s) on this subject dated November 18, 2011 and May 18, 2012.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

The following table lists the future effective dates with the corresponding reference.

| Future Effective Date | Reference       |
|-----------------------|-----------------|
| January 31, 2014      | Entire Standard |



AUGUST 10, 2012



ANSI/UL 1678-2012

1

## UL 1678

### **Standard for Household, Commercial, and Institutional-Use Carts, Stands and Entertainment Centers for Use with Audio and/or Video Equipment**

The First, Second, and Third Editions were titled Standard for Household, Commercial, and Professional-Use Carts and Stands.

The Fourth Edition was titled Standard for Household, Commercial, and Professional-Use Carts and Stands for Use with Audio/Video Equipment.

Prior to the Fifth Edition of UL 1678, the requirements for Tall Institutional Carts were included in the Standard for Tall Institutional Carts for Use with Audio-, Video-, and Television-Type Equipment, UL 1667.

First Edition – February, 1991  
Second Edition – December, 1996  
Third Edition – July, 1998  
Fourth Edition – December, 2001

### **Fifth Edition**

**August 10, 2012**

The most recent designation of ANSI/UL 1678 as an American National Standard (ANSI) occurred on August 10, 2012. The ANSI approval for this standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

This ANSI/UL Standard for Safety consists of the Fifth Edition.

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 <http://csds.ul.com>.

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**APPENDIX A**

Standards for Components..... A1

**APPENDIX B – TEST FIXTURE DETAILS** *(Refer to Figures 16.1 and 16.2)***APPENDIX C – HISTORICAL CRT TELEVISION TEST FIXTURE WEIGHT AND STABILITY PARAMETERS**

## INTRODUCTION

### 1 Scope

Section 1 effective January 31, 2014

1.1 These requirements apply to household, commercial, and institutional-use carts, stands and entertainment centers intended to provide a surface for the support or attachment of audio and/or video equipment.

1.2 These requirements also apply to tall institutional-use carts and stands intended to provide a surface for the support of audio and/or video equipment that have a support bracket or shelf that is more than 39.4 inches (1 m) above the floor and are intended for use in schools, institutions, hospitals or similar locations where children or persons with diminished capacity are likely to move them or may be asked to move them.

1.3 A furnishing intended to support audio and/or video equipment shall be evaluated in accordance with one of the following:

- a) If the audio and/or video support system is an entertainment center or a stand with or without casters or wheels, this standard applies;
- b) If the audio and/or video support system is intended to be mounted to walls, ceilings or another part of a building structure, the Standard for Wall and Ceiling Mounts and Accessories, UL 2442, applies;
- c) If a cart, stand or support surface is supplied with the audio or video equipment by the manufacturer of the audio or video equipment, the requirements contained in the audio or video component standard apply. The Standard for Audio, Video and Similar Electronic Apparatus, UL 60065, or the Standard for Information Technology Equipment – Safety, UL 60950-1, as applicable to the product, applies.
- d) Information Technology and Communications Equipment Cabinets, Enclosure and Rack Systems are investigated to the Standard for Information Technology Equipment – Safety – Part 1, UL 60950-1 or Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

1.4 These requirements do not apply to any electrical circuitry integral to or provided with a cart, stand or entertainment center.

## 2 Glossary

Section 2 effective January 31, 2014

2.1 For the purposes of this standard, the following definitions apply.

2.2 **ACCESSORY** – An optional part that interfaces with the basic cart, stand or entertainment center and is intended to be attached by the user or installer. Subassemblies field assembled to form the basic cart, stand or entertainment center are not accessories.

2.3 **APPURTENANCE** – Objects on a cart, stand or entertainment center such as a door, drawer, or a sliding work surface.

2.4 **CART** – A stand provided with casters, wheels, or rollers intended to make it easily mobile.

2.5 **CRT** – Cathode Ray Tube. A vacuum tube containing an electron gun used to create images on the screen.

2.6 **DEDICATED STORAGE AREA** – An area of a cart, stand or entertainment center intended to accommodate specific articles such as storage media: tapes, CDs, DVDs, and flash drives.

2.7 **DESIGNATED LOAD** – The maximum weight specified by the manufacturer that the cart, stand or entertainment center is intended to accommodate.

2.8 **ENTERTAINMENT CENTER** – A furnishing intended to support a television and the associated audio equipment; also provided with doors, drawers or shelves.

2.9 **HANDLE** – A feature that is specifically intended to facilitate carrying, transporting, lifting or movement of the total product. Features such as drawer pulls, knobs on drawers or doors, decorative moldings and shelf edges are not considered to be handles.

2.10 **INSTITUTIONAL AREAS** – Include but are not limited to health care facilities, old age convalescent board and care homes, college dormitories, schools, residence halls, jails, prisons, nursing care homes, public auditoriums, hotels and motels.

2.11 **MAXIMUM ANTICIPATED LOAD** – A test weight that is based on the usable volume of a compartment.

2.12 **MOUNTING SURFACE** – A surface that is a part of the cart, stand or entertainment center used for securing a flat panel video display (television) to the cart, stand or entertainment center. Flat panel video displays are connected to the mounting system or bracket with hardware and fasteners. Mounting surfaces may be fixed position or adjustable to various angles and heights.

2.13 **NORMAL USE** – Those operations performed by the user to utilize a fully assembled cart or stand, with or without equipment and accessory loads installed.

2.14 **ORDINARY TOOLS** – Tools which are normally expected to be available to the user, such as, flat-bladed and cross-recessed head (Phillips-type) screwdrivers, hammers, nut drivers, and pliers.

2.15 **RACK** – A type of framework designed to mount or secure audio, video and ITE equipment.

2.16 **RESIDENCE (HOUSEHOLD)** – A place where people live such as a house or apartment. The terms "household" and "residence" are equivalent.

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## 2.17 SIMULATED TELEVISION LOAD –

A test fixture intended to simulate a video display or television (as used within this Standard, the terms television, TV, and video display are equivalent).

a) Figure 16.1 – The fixture depicted simulates all technology televisions, monitors or video displays that are free standing and that will rest on a television shelf.

b) Figure 16.2 – The fixture depicted simulates flat panel video display television technology and is used for testing when the television is intended to be secured to a mounting bracket provided with the cart, stand or entertainment center.

2.18 STAND – A structure on or in which audio and/or video equipment and accessories are intended to be placed, contained, or mounted for support.

2.19 SUPPORTING SURFACE – Any surface (shelf, drawer, or similar surface) that is intended to support equipment or an accessory that is used with equipment (records, tapes, digital discs, headphones, and similar products).

## 2.20 TALL INSTITUTIONAL CART –

a) A cart where the television or apparatus supporting surface is more than 39.4 inches (1 m) above the floor and the cart is recommended by the manufacturer to be used in institutional areas where children, or people with diminished capacity are likely to move or may be asked to move the cart; or

b) A cart where the television when mounted to the mounting surface of the cart places the center line of the television surface more than 39.4 inches (1 m) above the floor and the cart is recommended by the manufacturer to be used in institutional areas where children, or people with diminished capacity are likely to move or may be asked to move the cart.

2.21 TELEVISION – Cathode Ray Tube (CRT), Monitor or Video Display – LED, LCD, OLED, Plasma or similar equipment intended to provide a visible image or information to the user.

2.22 TELEVISION SHELF – A horizontal or sloping surface specifically identified in the use and care instructions for the placement and support of a television.

2.23 USER ASSEMBLY – Any mechanical assembly of the cart, stand or entertainment center, performed by the user.

2.24 UTILIZATION EQUIPMENT – Equipment that utilizes energy for electronic, electromechanical, heating, lighting or similar purposes.

### 3 Components

Section 3 effective January 31, 2014

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.

3.5 An adhesively applied marking that is required to be permanent shall comply with the Standard for Marking and Labeling Systems, UL 969.

3.6 Polymeric materials required to meet flammability requirements shall comply with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

3.7 Receptacle outlets provided on a cart, stand or entertainment center shall comply with the Standard for Relocatable Power Taps, UL 1363, or the Standard for Furniture Power Distribution Units, UL 962A, and shall be mounted in accordance with the installation instructions.

### 4 Units of Measurement

Section 4 effective January 31, 2014

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

## 5 References

Section 5 effective January 31, 2014

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

Section 6 effective January 31, 2014

6.1 A cart, stand or entertainment center shall be constructed so that:

- a) User assembly and normal use do not result in a risk of fire, electric shock, or injury to persons; and
- b) The materials and components are used within their mechanical, electrical, and temperature limits.

### 7 Corrosion Protection

Section 7 effective January 31, 2014

7.1 Ferrous metal parts shall be protected against corrosion by galvanizing, plating, painting, powder coating, enameling, or other equivalent means when the corrosion of such parts is likely to result in a risk of fire, electric shock or injury to persons.

### 8 Sharp Edges

Section 8 effective January 31, 2014

8.1 Sharp edges shall not be accessible during user assembly or normal use. An accessible edge shall be smooth and well rounded to reduce the risk of a cut-type injury when contacted during user assembly or normal use. Compliance shall be determined in accordance with the Standard for Test for Sharpness of Edges on Equipment, UL 1439.

### 9 Securement of Supported Equipment

Section 9 effective January 31, 2014

#### 9.1 General-use carts

9.1.1 Supporting surfaces of a cart which are located more than 39.4 inches (1 m) above the floor shall be provided with a means to restrict equipment from sliding off the surface. A minimum 1/8-inch (3.2-mm) high lip or rail on the sides of the supporting surface or the equivalent obstruction meets the intent of the requirement.

*Exception: A supporting surface that is intended for use with equipment that is secured to it (that is, with bolts, screws, straps, or other securement means) is not required to comply with 9.1.1. The assembly of the equipment to the supporting surface shall be in accordance with the Use and Care Instructions, Section 25.*

9.1.2 The means for securing an electrical product shall be such that it does not present a risk of injury or electric shock.

## 9.2 Tall institutional carts

9.2.1 Supporting surfaces on a tall institutional cart which are located more than 39.4 inches (1 m) above the floor shall be provided with a mechanical means for securing equipment in accordance with 9.2.2.

9.2.2 Acceptable means for securement in accordance with 9.2.1 include screws, straps and similar securement means. The assembly of the equipment to the supporting surface shall comply with the Use and Care Instructions, Section 25.

## 10 Ventilation

Section 10 effective January 31, 2014

10.1 Each enclosed area of a cart, stand or entertainment center intended to accommodate electrical utilization equipment shall be provided with natural convection openings or a mechanical ventilation system for the equipment installed within the enclosed area. Installation and use instructions shall be used to determine the intended use of an enclosed area.

## 11 Materials

Section 11 effective January 31, 2014

11.1 Polymeric or similar material used in the construction of a cart, stand or entertainment center shall have a minimum flammability classification of HB. The flammability classification is to be determined by tests described in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94. A material classified using 1/8-inch (3.2-mm) thick bar specimens is able to be employed in thicknesses less than 1/8 inch in the cart, stand or entertainment center.

*Exception: The following materials are exempt from the requirements of 11.1:*

- a) Wheels, casters, and caster inserts.*
- b) External accessories that are not permanently attached to the cart, stand or entertainment center, such as a screwdriver, container of lubricating oil, and similar accessories.*
- c) Small parts that satisfy all of the following:*
  - 1) The maximum volume does not exceed 0.122 inch<sup>3</sup> (2 cm<sup>3</sup>); and*
  - 2) The maximum dimension does not exceed 1.18 inches (3 cm).*
- d) Polymeric material 0.010 inch (0.254 mm) thick or less.*

## 12 User Assembly

Section 12 effective January 31, 2014

12.1 A cart, stand or entertainment center intended to be user assembled shall comply with the following:

- a) The assembly shall be accomplished by the user with ordinary tools or with tools supplied with the cart, stand or entertainment center.
- b) All parts such as screws, bolts, and similar parts that are required to complete the assembly shall be provided.
- c) Assembly instructions shall be provided. The instructions shall not cause the user to commit an act that in itself might result in a risk of fire, electric shock, or injury to persons.

## 13 Wheels, Rollers and Casters

Section 13 effective January 31, 2014

13.1 The attachment of a wheel, roller, or caster to the cart shall comply with the Wheel, Roller, or Caster Securement Test, Section 21.

13.2 A tall institutional cart shall be provided with casters having a minimum diameter of 4 inches (101.6 mm).

## PERFORMANCE

### 14 General

Section 14 effective January 31, 2014

14.1 A cart, stand or entertainment center shall be assembled in accordance with the manufacturer's instructions. The Use and Care Instructions, Section 25, are to be used as a reference during the examination and tests of a cart, stand or entertainment center.

14.2 As specified in each test procedure, each shelf, drawer or supporting surface shall be loaded in accordance with Table 14.1.

**Table 14.1**  
**Supporting surface loading parameters**

| Surface type                                     | Load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Television shelf or mounting surface             | Fully loaded with the manufacturer's specified weight.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Other supporting surface                         | Fully loaded with the manufacturer's specified weight.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Dedicated storage area                           | Fully loaded with the manufacturer's specified weight.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Tall institutional cart designated load          | A "designated load" is to be either the maximum weight specified by the manufacturer that the tall institutional cart is intended to accommodate, or the value determined using the following equation, whichever is greater: $W = 0.015V$ (416V) in which: W is the weight in pounds (kg), and V is the useable volume of the compartment in cubic inches (cubic meters). If the height of the compartment exceeds 7.5 inches (19.1 cm), a value of 7.5 inches (19.1 cm) is to be used in computing the volume.                            |
| Tall institutional cart maximum anticipated load | A "maximum anticipated load" is to be used to represent the worst case equipment loading when the use of a supporting surface is not specified and is not limited. The weight of the maximum anticipated load is to be computed by the following formula: $W = 0.03V$ (832V) in which: W is the weight in pounds (kg), and V is the useable volume of the compartment in cubic inches (cubic meters). If the height of the compartment exceeds 7.5 inches (19.1 cm), a value of 7.5 inches (19.1 cm) is to be used in computing the volume. |

## 15 Temperature Stability Test

Section 15 effective January 31, 2014

15.1 A cart, stand or entertainment center employing polymeric materials (non-decorative) that provide structural support of the stand assembly or restraint for equipment shall comply with the stability and loading tests after the environmental conditioning specified in 15.2.

15.2 An unloaded cart, stand or entertainment center is to be placed in a full-draft circulating-air oven. The air temperature within the oven is to be maintained at 70°C (158°F) for 7 hours.

## 16 Tip Stability Test

Section 16 effective January 31, 2014

### 16.1 General

16.1.1 Section 16.2 applies to a cart or stand intended to support or store audio and/or video equipment other than a television or having other general storage. When a cart or stand incorporates a support surface (television shelf) or a mounting surface for a television, Section 16.3 applies. When a cart, stand or entertainment center incorporates support for audio and/or video equipment or general storage and a support surface or a mounting surface for a television, both Sections 16.2 and 16.3 apply.

16.1.2 A cart, stand or entertainment center supplied with a system to anchor the product to a structure shall comply with these requirements without the anchoring or securement system installed.

16.1.3 A test platform or floor larger than the cart, stand or entertainment center shall be used and shall be level  $\pm 0.2$  degrees. The incline plane shall then be placed on or attached to the test platform.

## **16.2 Carts or stands intended to support or store audio and/or video equipment other than a television or having other general storage**

16.2.1 A cart or stand shall not tip over when placed at the center of a plane inclined to make an angle of  $10 \pm 0.2$  degrees with the horizontal. The test shall be repeated with any side of the cart, stand or entertainment center oriented toward the bottom of the incline plane.

*Exception: If a stand is permanently marked as indicated in 24.6 to indicate that a side of the unit is to be placed against a wall or other fixed structure, the marked side is not to be oriented toward the bottom of the incline plane.*

16.2.2 The test shall be conducted with all of the following:

- a) The legs, wheels, casters, or similar means of support, arranged in the position most likely to result in tip-over and blocked so that the cart or stand does not slide on the inclined plane. The thickness of the mechanism employed to block casters or wheels shall be a maximum of 1/8th the diameter of the caster or wheel.
- b) All doors, drawers and other movable or adjustable parts shall be positioned as they will normally be used. Doors which must be open to view a television or to remotely operate components shall be in the open position. Doors, drawers, and shelves that are intended for accessories such as tapes, headphones, digital discs, and similar accessories are to be secured closed so as not to open when placed on the incline plane.
- c) Each of the remaining supporting surfaces not specified in 16.2.2 (b) shall be loaded as described in Table 14.1, or unloaded, whichever is most likely to result in tip over.

16.2.3 When loading shelves and drawers, the load is to be centered front to back and side to side on the surface and evenly distributed across the surface under test.

16.2.4 When a supporting surface is provided with a means to secure a product (such as straps, screws or similar securement means), the securement means and any use and care instructions are to be used when positioning the load. The load is to be placed within the confines of the securement means in the position most likely to result in tip over.

### 16.3 Carts, stands and entertainment centers having a support surface or mounting surface for a television

16.3.1 A cart, stand or entertainment center intended for use with a television shall not tip over when placed at the center of a plane inclined to make an angle of  $10 \pm 0.2$  degrees with the horizontal and loaded as specified in Table 14.1. Also refer to Section 16.2 when other storage and support surfaces are provided. The surface intended to support a television shall be loaded with the simulated television load described in 16.3.4. If the manufacturer specifies a television weight range, then the test is to be conducted with the heaviest weight television unless a lower weight television is determined to cause the cart, stand or entertainment center to be less stable.

16.3.2 Except as described in 16.3.3, when a simulated television load as described in 16.3.4 is used on a television shelf, it is to be oriented within the confines of the useable television shelf in the position most likely to result in tip-over. The recommended television shelf is to be specified in the Use and Care Instructions, Section 25.

16.3.3 When a television shelf or mounting surface is provided with a means to secure the television to the supporting surface with straps, screws or similar securement means, the use and care instructions are to be used when positioning the load. The load is to be placed within the confines of the securement means in the position most likely to result in tip over.

16.3.4 When performing the Tip Stability Test, a simulated television load is to be used to represent the loading of the television shelf or television mounting surface. The simulated television test fixture weight and configuration are determined by the specified television weight range recommended for use on the cart, stand or entertainment center by the manufacturer. See Table 16.1 for the free standing simulated television loading parameters. The test fixture to be used for the simulated free standing television load is shown in Figure 16.1. The test fixture for a television intended to be secured to a mounting surface provided as part of the cart, stand or entertainment center, is shown in Figure 16.2. Appendix C provides the reference for the weight to size ratio of CRT televisions for carts, stands and entertainment centers.

*Exception: Simulated TV weight load test fixtures other than those specified in Figure 16.1 or Figure 16.2 may be used if found to provide the same test results as obtained by the specified test fixtures.*

16.3.5 If the cart, stand or entertainment center has both a television shelf and television mounting surface, each of these surfaces shall be tested individually (one surface at a time).

*Exception: If the use and care instructions specify the cart stand or entertainment center is intended for use with more than one television.*

16.3.6 The test shall be repeated with any side of the cart, stand or entertainment center oriented toward the bottom of the incline plane.

*Exception: If the cart, stand or entertainment center is permanently marked as indicated in 24.6 to indicate that a side of a unit is to be placed against a wall or other fixed structure, the marked side is not to be oriented toward the bottom of the incline plane.*

16.3.7 The test shall be conducted with all of the following:

- a) The legs, wheels, casters, or similar means of support, arranged in the position most likely to result in tip-over and blocked so that the cart, stand or entertainment center does not slide on the inclined plane. The thickness of the mechanism employed to block casters or wheels shall be a maximum of 1/8th the diameter of the caster or wheel.
- b) All doors, drawers and other movable or adjustable parts shall be positioned as they will normally be used . Doors which must be open to view a television or to remotely operate components shall be in the open position. Doors, drawers, and shelves that are intended for accessories such as tapes, headphones, digital discs, and similar accessories are to be secured closed so as not to open when placed on the incline plane .
- c) Each of the remaining supporting surfaces shall be loaded as described in Section 16.1 and Table 14.1 or unloaded whichever is most likely to result in tip over.

16.3.8 A mounting surface that allows the longest axis of the television to be mounted horizontally or vertically shall be tested in both orientations. If the mounting surface is adjustable or articulating, the mounting surface shall be moved to the least stable position. The adjustment may be made either prior to or after placement on the incline plane. The test fixture to be used to simulate a television mounted to an integral mounting bracket is shown in Figure 16.2 and an example of the weight distribution is shown in Figure 16.3.

16.3.9 Figure 16.2 represents a center of gravity of the mounted television at 3 inches  $\pm$  ½ inch from the bracket mounting surface. This is the default center of gravity for all mounted televisions. All carts, stands or entertainment centers provided with a mounting surface shall comply with the stability and loading tests at this center of gravity position.

*Exception No. 1: A manufacturer may test and specify a center of gravity range or a distance from the front plane of the television to the mounting surface in the use and care instructions provided the 3 inch position is included within the range. The product shall be permanently marked in accordance with 24.7.*

*Exception No. 2: A cart, stand or entertainment center designed to mount a specific television or television series may be tested using that television series or using the test fixture shown in Figure 16.2 with a center of gravity at other than 3 inches provided the cart, stand or entertainment center is permanently marked as specified in 24.8.*