

**PRACTICAL APPLICATION GUIDELINE:
INFORMATION TECHNOLOGY EQUIPMENT
INTENDED TO BE USED BY CHILDREN**

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SCOPE

This document provides practical application guidance on the UL certification of information technology equipment (ITE) that is intended to be used by children, typically 3 years of age and above and under 14 years of age.

For purposes of UL ITE certification, ITE *intended* for children is considered different than ITE that children *may be exposed to*. Children of most ages are being exposed to ITE, and there are no explicit restrictions or limitations placed on UL-certified ITE that children might be exposed to, other than what is contained in the current Standard for Safety of Information Technology Equipment, UL/IEC 60950-1. However, when ITE is specifically marketed for this user segment and is intended to be used by children, or it incorporates child-based themes in its design, the level of concern and potential for foreseeable abuse increases, so the requirements in UL/IEC 60950-1 are supplemented by other appropriate requirements.

This Guideline de-emphasizes the "electric toy" characterization for this type of ITE, and instead characterizes these products as "ITE intended to be used by children." Although it is a somewhat subtle difference, it is not appropriate to associate the traditional "toy" definition with most of these modern computer-based products and accessories that are intended to be used by children. In fact, typically, manufacturers view this type of ITE as a 'child development tool' versus a 'plaything'. However, since some of the potential hazards remain the same, there is justification for consideration and application of appropriate requirements associated with standards addressing safe use of products by children. This view is consistent with U.S. law as documented in [US CFR Title 16, Chapter II, Subchapter C, Part 1505](#), which considers not only to 'toys', but also "*other electrically operated article[s] intended for use by children.*"

For ITE designed and intended by the manufacturer to be used by children less than 3 years of age (36 months), additional considerations and requirements are applicable that are more complex and detailed than those that can be contained in this type of guideline. The feasibility of UL certification of such products will be considered on a case-by-case basis and will involve a more in-depth analysis.

Similarly, it may be possible to introduce appropriate additional age-related considerations into the application of these supplemental requirements when the ITE is intended to be used by children at an age range starting at a higher age than 3 years of age (e.g., 5 years of age and older).

BACKGROUND

As more and more children are becoming exposed to personal computers and similar ITE at an earlier age, ITE manufacturers are beginning to design, build and market equipment for this segment of the ITE market. While children themselves typically do not purchase, assemble or configure the equipment, the equipment aesthetics and/or function promote child use and interface.

Examples of ITE that are intended to be used by children include:

- personal computer (PC) systems, either desktop or notebook type, sometimes with child-based themes, and typically having a connection to the a.c. mains, either directly (e.g., desktop) or indirectly through an external power supply (e.g., notebook). Assembly and initialization typically are performed by adults;
- accessory keyboards, sometimes with child-based themes, featuring designs or aesthetics that are intended for, or promote use by children and that plug into low-voltage (SELV) ports of standard PCs;
- other miscellaneous accessories and peripherals, such as mice and joysticks, steering wheels, digital cameras, drawing tables, etc., sometimes with child based themes, but intended for use by children.

Information Technology Equipment

ITE is certified for safety to the Standard for Safety of Information Technology, UL/IEC 60950-1. IEC Technical Committee 108 (TC108), Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology, is responsible for the base content of IEC 60950-1. In the U.S. and Canada, UL and CSA have developed a bi-national national standard, CSA/UL 60950-1, with National Differences, through the respective U.S. and Canadian standards development processes.

IEC TC108's Hazard-Based Standard Development Team (HBSDT), which is an integrated team within IEC TC108, is developing a new hazard-based standard (IEC 62368) for audio/video, information technology and communication technology equipment, which will include requirements addressing accessibility of ITE by children in greater detail than in the existing ITE and A-V safety standards. This Guideline will be revisited when IEC 62368 is published and a corresponding ANSI/US National Standard is proposed with U.S. National Differences. However, until that time this document will document the UL certification policy for such equipment.

Electric Toys

UL investigates electric toys to the Standard for Safety of Electric Toys, UL 696. The Scope of UL 696 states its requirements *"cover electrically-operated toys including miniatures of full-sized appliances that may not necessarily perform the expected function of the copied appliance and that are intended to be used on nominal 120-volt branch circuits. The package for the toy, including packaging material if intended to be used with the toy, is considered to be a part of the toy and is covered by these requirements. An electric product is considered a toy if it is designed, manufactured, or marketed as a plaything for children over the age of 3."*

Key concepts are that UL 696 only applies to mains-connected products, and it only applies to products intended as a plaything for children over the age of 3. "Electric toys" are Listed and placed in the UL category for Toys (XNIZ).

Non-Electric Toys

UL investigates non-electric toys, including battery-operated toys, to the Standard Consumer Safety Specification on Toy Safety, ASTM F963. The Scope of this standard states "*This specification relates to possible hazards that may not be recognized readily by the public and that may be encountered in the normal use for which a toy is intended or after reasonably foreseeable abuse. It does not purport to cover every conceivable hazard of a particular toy. This specification does not cover product performance or quality, except as related to safety...*" and "*...contains test methods for toys intended for use by children under 14 years of age.*" This standard is also referenced in UL 696 sections 7 and 15. Non-electric toys are Classified and placed in the UL category for Toys and Children's Play Articles (XNPY).

CERTIFICATION STRATEGY

This Guideline for ITE intended for use by children provides a UL certification strategy to address normal use and foreseeable misuse of such products.

- a) UL certifications covered by this Guideline are placed in the product category Information Technology Equipment (NWGQ).
- b) The base safety standard for evaluating safety of ITE that is intended to be used by children is the Standard for Safety of Information Technology Equipment, UL/IEC 60950-1.
- c) Supplementing UL/IEC 60950-1 are additional requirements that are determined by use of sound Hazard Based Safety Engineering (HBSE) principles. Through HBSE, it will be determined whether there are any potential hazards that are not adequately addressed by UL/IEC 60950-1 and whether additional requirements are needed that supplement the base UL/IEC 60950-1 requirements. If potential hazards are identified by HBSE that are not addressed in UL/IEC 60950-1, appropriate requirements from UL 696 or ASTM F963, or proper derivations of them will be applied if they are not already addressed in UL/IEC 60950-1. If the potential hazard is not addressed by UL/IEC 60950-1, UL 696 or ASTM F963, appropriate requirements will be developed based on the specific construction/application.

OUTLINE OF KEY CONSIDERATIONS

The following are a number of common key safety considerations that have been identified as applicable to ITE intended for use by children that extend beyond the typical application of UL/IEC 60950-1. Based on the actual product and intended application, some of these considerations may be determined not to be valid, or additional considerations based on HBSE principles may be identified requiring additional requirements to be identified and applied.

Assembly and Use

Although a child 3 years of age and older may be the intended user of a product, for products with moderate-complex installation or initialization procedures, including ITE with a.c. mains connections, the assembly, initialization, other similar complex operations that could have safety-related implications should be performed by an adult, supplemented by the adult providing adequate pre-use instruction (education) to the child. This is a key underlying principle when reviewing the ITE and determining appropriate markings and instructions. See Markings, Safety Instructions and Packaging.

Construction

Accessibility

The test finger (Figure 2A) and test pin (Figure 2B) in IEC 60950-1 are not considered by UL to adequately represent the fingers of small children. The UL Articulated Finger Probe was designed to consider accessibility by small children. Therefore, for a.c. mains-connected ITE intended to be used by children the outer electrical and mechanical enclosures should be subjected to 60950-1 Clause 2 Accessibility requirements using the UL Articulated Finger Probe in addition to the IEC finger probe and test pin. However, the UL probe only needs to be applied to the outer enclosures and should not be used on internal parts with the covers removed.

All other UL/IEC 60950-1 accessibility requirements remain valid.

Transformers and Power Supplies

UL 696 requires all mains-isolating transformers to be compliant with UL 697, Toy Transformers. Typically, these transformers, and external power supplies incorporating switching mode technology and used by children, are certified under the category for Toy Transformers (XRBV). However, existing UL/IEC 60950-1 transformer and SELV requirements are considered to meet or exceed UL 697, so no additional construction or performance considerations related to transformers typically are necessary for mains-isolating transformers and external power supplies used for ITE applications.

Typically, power supplies should comply with either Power Supplies, ITE (QQGQ) or Direct Plug-in and Cord-Connected Class 2 Power Units (EPBU).

Direct Plug-in Unit Power Supply

If it is expected that a Direct Plug-in Unit (DPIU) Power Supply will be handled by a child, the distance from the perimeter of the device to the blades should be in accordance with sub-clause 5.17 (and Figure 5.5) of UL 1310, Class 2 Power Units. For electric toys, UL 1310 requires a minimum distance of 7.9 mm from perimeter to blades instead of the minimum 5.1 mm that is intended for equipment intended to be used by adults.

Sharp Edges

Although UL/IEC 60950-1 addresses sharp edges generically in 4.3.1, special consideration should be given to the determination that there are no potentially hazardous sharp edges on the product, including sharp edges formed after UL/IEC 60950-1 Mechanical Strength Tests (e.g., Impact or Drop Tests, as applicable). Sub-clause 4.7 of ASTM F963 more specifically addresses the general considerations of UL/IEC 60950-1 sub-clause 4.3.1.

Power Supply Cords & Interconnect Cables

ASTM F963 addresses a general concern that cords & cables will not form a loop and possibly choke a child. In general, present ITE power supply cords & cables (e.g., keyboard cables) meet the intent of sub-clause 4.14 of ASTM F963 due to their construction and ability to slip out of their host connectors if pulled. For questionable constructions, sub-clause 4.14 of ASTM F963 should be consulted.

Performance

Testing described below should be conducted by UL, or by the manufacturer or an authorized laboratory if the manufacturer or laboratory is covered under one of UL's Data Acceptance Programs (DAP).

Surface Temperatures

UL/IEC 60950-1 does not specify a maximum value specifically designed for transportable equipment (e.g., notebook computers) that may be in contact with bare skin for extended periods, although it contains general temperature limits for handles and other parts that may be touched. For notebook computer and similar transportable equipment, it is expected that children likely may place the ITE on their laps more frequently than adults, even if there is given instruction not to. Therefore, there needs to be closer scrutiny of the actual notebook temperatures with this respect, in particular for surfaces that may be placed on the lap.

Typically, for such transportable equipment, UL will require additional temperature measurements to be made on the surfaces of the ITE so that a more complete temperature profile of the surface can be obtained.

Subsequently, these temperatures will be reviewed in light of the overall temperature profile, existing safety standards, anticipate usage model(s) and any associated instructional safeguards. The temperature limits in UL/IEC 60950-1 with respect to the bottom surface of the ITE may need to be adjusted/supplemented for this application.

Other accessible surface areas of transportable ITE, including an external power supply that may be touched, should be subjected to the following temperature limits, with maximum specified ambient temperature (T_{ma}) also factored in:

- UL/IEC 60950-1: 75 C maximum; ,
- UL 696: 55K rise, Surface D, Thermal Inertia = III); and
- ASTM F963: 71 C maximum, for surfaces of battery pack (4.25.7)

Keyboard Keycaps

From an HBSE perspective, keycaps being removed or dislodged while a child is playing with the keyboard is a valid concern since such an occurrence could potentially result in a choking hazard if a child, not necessarily the user, attempts to swallow the keycap. Not only may children using the ITE be subjected to this potential hazard, but there may be younger children below 3 years of age in the area when an older child is playing with the ITE.

ASTM F963 addresses these types of potential hazards with a series of Abuse Tests in sub-clauses 8.6 - 8.10 and Table 5 of the Standard. Impact, Torque and Tension tests are considered applicable to key caps and similar small parts, and the values "recommended for toy manufacturers" in Table 5 should be used.

If keyboard caps dislodge during abuse testing, an additional marking per sub-clause 5.11.2 of ASTM F963 is required (⚠ Warning: Choking Hazard – Small parts. Not for children under 3 yrs.”).

Flammability

ASTM F963 includes a candle test for toys in its Annex A.4 (“Flammability Testing Procedure for Toys”). Since this test is not comparable to other tests required by UL/IEC 60950-1, ITE intended for use by children should comply with this test.

Toxicology

Paints and Coatings

From a HBSE perspective, there is concern with the toxicology of coatings, plating, and similar surface-coating materials, including such coatings on labels, which a child could be exposed to during normal use and foreseeable misuse. Both Section 7 of UL 696 and sub-clauses 4.3 and 8.2-8.3 of ASTM F963 address the concern of surface coatings.

A surface coating is an accessible liquid coating material (such as paint, enamel, lacquer, ink, and the like) applied to a product. For surface coating materials, such as keyboard numbering, designs on mice, and other designs that are likely to be touched or rubbed regularly by the child:

- All paints and coatings shall contain no lead in excess of 0.06 % (600 ppm) of the weight of the total nonvolatile content of the paint or the weight of the dried paint film.
- Other hard metals, such as antimony, arsenic and similar substances described in ASTM F963 shall not be present in levels exceeding the stated limits, shown in Table 1 of ASTM F963, if 10 mg or more of the material can be scraped off the product.

For purposes of application of this toxicology requirement, it can be assumed 10mg of the material is available if any of the material can be scraped off the product. For keyboards and similar accessories with coatings stenciled on plastic, it actually may not be possible to scrape off or separate any "coating" from the plastic base. In such cases, the lead restriction would be applicable, but testing for other heavy metals would not.

For determination of the amount of lead, and for other hard metals that have 10 mg or more of sample, ASTM F963 contains limits (Table 1) and a test procedure (8.3.4) for determining compliance. This same information is required to be made available to the Federal Government by U.S. Law, i.e., 16 CFR Part 1303.

Example Test Plan

Provided below is an example test plan for ITE intended to be used by children. There may be additional tests, or fewer tests, depending on the specific product under investigation.

<u>Test</u>	<u>Standard [Ref:]</u>	<u>Sub-clause/ Paragraph</u>
Input Current	A, B	1.6.2
SELV measurement	A, B	2.2
Limited Power Source (LPS) measurement	A, B	2.5
Mechanical Strength, including Drop Test, as appropriate	A, B	4.2.6
Battery Performance Testing, including operation of any battery pack in the system	A, B	4.3.8
Heating (thermal requirements, including bottom surfaces that may be rested on the lap/skin)	A, B	4.5 (1.4.12/1.4.13)
Touch Current, including accessible surfaces	A, B	5.1
Abnormal Operation, including Overload of Operator	A, B	5.3
Accessible Connectors		
Flammability	C	4.2
Temperature Test on Battery surface	C	4.25
Toxicology Test	C	8.3
Impact Test	C	8.7
Torque Test	C	8.8
Tension Test	C	8.9
Test for Toys which Produce Noise #	C	8.20
Packaging Film Thickness	C	8.22

Standard References:

- IEC 60950-1, Second Edition, Safety of Information Technology Equipment [Ref: A]
- CSA/UL 60950-1, Second Edition, Safety of Information Technology Equipment [Ref: B]
- ASTM F 963, 2003 Edition, Standard Consumer Safety Specification on Toy Safety [Ref: C]
- UL 696 Ninth Edition, Safety for Electric Toys [Ref: D] (Informative)

Markings, Safety Instructions and Packaging

General

All markings and instructions associated with both the product and the packaging should be reviewed to determine that clear and proper instructions are communicated to the consumer (adult) and child, as appropriate, and that there are no non-intended hazards introduced by unclear or unsafe instructions. Whenever possible, assembly and initialization of the equipment, including connection to the a.c. mains (power outlet), should be designated as an activity that is the responsibility of an adult, and adult supervision of the child during use of the ITE should be stressed.

The information/instructions outlined above may be provided prominently on the first page of a booklet or on a single sheet of paper.

The information/instructions should be provided in the local/regional language for which the ITE will be distributed.

Format

ASTM F963 requires mandated labeling to be presented in a specific format, and be applied so as to be not removable after normal use and foreseeable abuse. Sub-clause 5.2 of F963 should be consulted for proper formatting and lettering size considerations.

Adhesion

Since UL/IEC 60950-1 does not contain a label adhesion test, all labels not included in recessed moldings should be subjected to the Adhesion Test in UL 969, Marking and Labeling Systems.

Common Considerations for inclusion in Safety Instructions

Provided are examples of safety considerations for this class of equipment that instructions may need to be provided to address safe operation of the product by children. Typically, the messages associated with the considerations below are aimed at the adult supervising the child. The final determination of an appropriate set of safety messages/instructions will be based on the specific construction and application.

- Minimum age of the child that may be provided with (use) the [ITE product].
- For ITE with power supplies not intended to be handled by children:

“As with all electrical products, precautions should be observed during handling and use to prevent electric shock. The power supply (adapter) should not be handled by the children.”

- For ITE with power supplies (DPIU or adapter) intended to be handled by children:

“As with all electrical products, precautions should be observed during handling and use to prevent electric shock. The child should be very careful while handling the power supply (adapter), in particular plugging the power supply into the receptacle (power outlet).”
- “The [ITE product] should not be placed on the bare skin (lap) of the child for long periods. The laptop should be placed on another surface, like desk tabletop, if intending to use it for more than a few minutes.” [For transportable ITE, e.g., notebook computer system.]
- The [ITE product, including power supply and battery pack, as applicable] should not be left in the rain or subjected to exposure to water. If cleaning is necessary do not immerse in water; wipe clean with damp cloth.
- “The [ITE product, including power supply and battery pack, as applicable] should not be dropped, crushed (stepped on) or otherwise abused.” [For transportable ITE, e.g., notebook computer system.]
- “The children should be careful with the interconnect cable (wiring) between the power supply (adapter) and laptop, in particular as a potential trip hazard.” [For transportable ITE, e.g., notebook computer system.]
- “An adult should inspect the [ITE product, including power supply and battery pack, as applicable] periodically for damage, and replace if necessary. Similarly, if a child notices damaged/broken parts, this should be reported to the teacher immediately so that the damaged parts can be replaced.”

Mains connected equipment

For a.c. mains connected equipment intended to be used by children 3 years of age and older, and the child is expected to interface and perform some user function with the part of the equipment connected to the mains (e.g., tower PC), the following marking, or some similar derivation of it shall be supplied on the equipment:

CAUTION - ELECTRICALLY OPERATED PRODUCT. THIS IS NOT A TOY. TO AVOID RISK OF ELECTRIC SHOCK OR FIRE IT SHOULD NOT BE USED WITHOUT ADULT SUPERVISION OR PLACED WHERE SMALL CHILDREN CAN REACH IT.

For ITE with a mains connected external power supply that provides SELV via an interconnect cable to the part of the system the child is expected to interface with, the above marking may be applied to the power supply only.

Alternatively, the marking(s) specified above may be provided prominently in the Users Manual if the following symbols are marked on the product:



The Safety Instructions also should have the following wording, or some derivative based on the particular application:

CAUTION - ELECTRICALLY OPERATED PRODUCT. Not recommended for children under 3 years of age [or other intended age range]. As with all electrical products, precautions should be observed during handling and use of electrical products to reduce the risk of electric shock.

Accessories

The Safety Instructions should have the following wording, or some derivative based on the particular application:

CAUTION – [KEYBOARD] USED WITH ELECTRICALLY OPERATED PRODUCTS. Not recommended for children under 3 years of age [or other intended age range]. As with all electrical products, precautions should be observed during handling and use of electrical products used with this [keyboard] to reduce the risk of electric shock.

Packaging

If the ITE is packaged with flexible film bags, a statement such as the following should be provided on the packaging: "CAUTION - Keep away from small children; the thin film may cling to nose and mouth and prevent breathing."

GLOBAL CONSIDERATIONS

Canada

ITE intended to be used by children and to be sold in Canada also should comply with appropriate Canadian national requirements. The Canadian government publishes an [Industry Guide to Canadian Safety Requirements for Toys and Related Products](#), which provides guidance to manufacturers requiring to comply with the Canadian Hazardous Products Act and the Hazardous Products (Toys) Regulations.

Europe

ITE intended to be used by children and intended to be sold in Europe also may need to comply with appropriate European Directive, in particular the Safety of Toys Directive. The European Commission provides an [Overview of the Toy Sector and EU Activities](#), and UL is available to assist manufacturers determine the impact of the Toy Directive on their products.