

SUMMARY OF TOPICS

The proposed first edition of the Standard for Audio/video, information and communication technology equipment – Part 1: Safety requirements, UL 62368-1, is being proposed:

1. This Proposed First Edition of the Standard for Audio/video, information and communication technology equipment – Part 1: Safety requirements, UL 62368-1 is applicable to the safety of electrical and electronic equipment within the field of audio, video, information and communication technology, and business and office machines with a rated voltage not exceeding 600 V. This standard does not include requirements for performance or functional characteristics of equipment. Note that the subject number "UL 6268" will be used to identify CSDS proposals for UL 62368-1 until the first edition of the Standard is published.

STP BALLOTS AND ALL COMMENTS DUE: NOVEMBER 7, 2011

1. This Proposed First Edition of the Standard for Audio/video, information and communication technology equipment – Part 1: Safety requirements, UL 62368-1 is applicable to the safety of electrical and electronic equipment within the field of audio, video, information and communication technology, and business and office machines with a rated voltage not exceeding 600 V. This standard does not include requirements for performance or functional characteristics of equipment. Note that the subject number "UL 6268" will be used to identify CSDS proposals for UL 62368-1 until the first edition of the Standard is published.

BACKGROUND

The International Electrotechnical Commission (IEC) has developed and published a new hazard-based standard for Audio/Video, Information Technology and Communication Technology Equipment, IEC 62368-1, which will eventually replace the existing IEC Standards for ITE/Telecom (IEC 60950-1) and A/V (IEC 60065). Based on support from related North American industry groups, a Technical Harmonization Committee (THC) was created with representatives from CSA, UL and several industry groups to proceed with the development of a new U.S./Canadian bi-national Standard based on this new IEC Standard. The new CSA/UL bi-national standard will *ultimately* replace the following existing Standards: UL 60065, CAN/CSA C22.2 No. 60065, and the U.S./Canadian bi-national standard CSA/UL 60950-1.

It should be noted that the IEC Technical Committee responsible for IEC 62368-1, IEC TC 108, has recommended that National Committees adopt and use IEC 62368-1 First Edition as an alternative to IEC 60065 and IEC 60950-1 to facilitate the overall transition process to the new hazard based approach used in the new standard. It is expected that the Second Edition of IEC 62368-1 will ultimately replace IEC 60065 and IEC 60950-1 and that the first edition upon which this proposal is based is intended to serve as a transition document.

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Taking into account the recommendation of IEC TC 108, upon publication of the First Edition of CSA/UL 62368-1, the standard will be available to use as an option to UL 60065, CSA 60065 and CSA/UL 60950-1. This is intended to give organizations an opportunity to become familiar with the new approach and associated National Differences for the U.S. and Canada.

Upon publication of IEC 62368-1 Second Edition, the THC will develop and submit a new proposal for CSA/UL 62368-1 Second Edition that will ultimately replace the current standards (UL 60065, CSA 60065 and CSA/UL 60950-1). The publication of the first edition of CSA/UL 62368-1 at this time will allow us to track more closely the implementation of IEC 62368-1 globally and have the opportunity to gain experience with the new hazard based approach during the interim period.

RATIONALE

Proposal submitted by: The Technical Harmonization Committee (THC) for Audio/Video, Information Technology, and Communication Technology Equipment, THC 62368; Kevin Ravo, UL, Chair.

These proposals are based on the First Edition of IEC 62368-1 as published in January 2010. Following the practice that has been used for the CSA/UL 60950 series of Standards, the intent of the harmonization effort for CSA/UL 62368-1 has been to minimize the number of national differences from IEC 62368-1 in the binational version, CSA/UL 62368-1.

The THC reviewed all of the existing National Differences in CSA C22.2 No. 60065, UL 60065, and CSA C22.2 No. 60950-1 / UL 60950-1 and also considered the need for any new National Differences. Below is a list of the National Differences the THC has determined should be included in the Proposed First Edition of CSA/UL 62368-1, and the associated Rationale. If the National Difference is based on an existing National Difference in CSA 60065, UL 60065 or CSA/UL 60950-1, that is also noted.

NATIONAL DIFFERENCES IN CSA/UL 62368-1

IEC Clause reference (ND reference)	Rationale / Justification	Source
1 (1DV.1.1, 1DV.1.2, 1DV.1.3)	IEC 62368-1 covers most aspects of safety of AV and IT/CT Equipment with a set of requirements based on hazard based safety engineering (HBSE). However, it does not contain sufficient requirements to allow for a complete investigation of the safety of the equipment and its installation in accordance with applicable Regulations and Codes in Canada and the United States. The proposed Regulatory Annex (DVA) identifies those requirements that are applicable to Information Technology, Communication Technology and Audio/Video Equipment intended to be installed in Canada and the U.S.	National Electrical Code (NEC), NFPA 70; Canadian Electrical Code (CEC), Part I; Variety of other Regulations and Codes applicable in the U.S. and Canada.
1 (1DV.2.1)	Requirements for AV and IT/CT equipment used for entertainment purposes in non-critical care, patient recovery areas of health care facilities were originally developed for inclusion within the legacy UL 492 Standard (first proposals were dated May 1974) and CAN/CSA C22.2 No. 1. Later, these requirements were carried into subsequent versions of the CSA and UL standards covering these products. The driver for development of these requirements was to fulfill a need expressed by hospital administrators for evaluation of television receivers to a level of safety that was consistent with anticipated installation (including wall-mounting) and use (interconnected pendant controls operated by the patient and interconnected pillow speakers taken into the bed by the patient). During the time of development, the first edition of UL 1069, Standard for Hospital Signaling and Nurse Call Equipment was referenced for several requirements.	UL 60065: Annex Q; NEC: Art 517; NFPA 99; - CAN/CSA C22.2 No. 1 Clause 17

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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued on Next Page



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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued

IEC Clause reference (ND reference)	Rationale / Justification	Source
1 (1DV.2.2)	Requirements for AV and IT/CT equipment designed for mounting under cabinets in kitchens within the home were originally developed for introduction into the UL 1270, UL 1409 and UL 1410 AV standards in the 1987 – 1989 timeframe. During the time of development of these requirements, the intention was to harmonize with the existing requirements from CAN/CSA C22.2 No. 1-1981. These requirements were published and eventually were carried into UL 1492, UL 6500 and UL 60065. Within the kitchen, possible foreseeable operating conditions include: operation while located above a boiling source of liquid (high humidity) and while located above an external heat source (elevated operating ambient). Use of these additional requirements have demonstrated their effectiveness in reducing risks of electric shock, fire and mechanical injury hazards for this specific product application.	UL 60065, Annex R; [CAN/CSA C22.2 No. 1, subclause 6.15]
1 (1DV.2.3)	Clarifies that the standard does not apply to equipment having RFT circuits and that such equipment is covered by CSA/UL 60950-21.	
1 (1DV.2.4)	Clarifies that additional requirements may apply to large data storage equipment and refers to CSA/UL 60950-23.	
1 (1DV.3)	Clarifies that additional requirements may apply to equipment for outdoor installation and updates the Note to refer to CSA/UL 60950-22 and also to CSA 60065 and UL 60065.	
1 (1DV.4)	Power distribution equipment frequently is used with IT/CT equipment, and typically either co-exists in the same rack or cabinet with the IT/CT equipment, or is located nearby in the same room/location. Power distribution equipment also sometimes is used to power AV equipment, for example in home theater systems. Traditionally in an ITE context, much of this type of power distribution equipment has been located exclusively within a computer room/data center, although there has been a trend over time for some of this same equipment to be installed in other similar locations used for facilitating the computing infrastructure. Today, manufacturers often request that these types of ITE power distribution equipment be investigated to an IEC 60950-based standard, and globally, most NCBs allow IEC 60950-1 as the base standard for much of this equipment. It is anticipated that similar requests will be made to investigate it to IEC 62368-1 since manufacturers often consider the equipment part of (a subsystem within) the overall equipment system. However, similar to IEC 60950-1, the scope of IEC 62368-1 currently does not specify inclusion of such equipment, and the Standard does not include safety requirements for some of the functions of such equipment, for example load transferring function of mains. With both the variety of power distribution equipment designed for high technology products increasing in scope, and the installation environments where it is being installed also changing, there is a need to better define the appropriate safety requirements for this segment of the high tech industry. Also, the current trend towards “green” data centers and computing, with specially designed equipment to accommodate energy efficient operation of high tech products, may increase the volume and variety of this specially designed power distribution equipment in the future. The intent of this proposal is to not introduce new requirements, but to reference requirements in existing publications, with appropriate supplemental considerations, as necessary.	
2 (2DV.1)	Added to provide a cross-reference to 4.1.1DV.1, which refers to Annex DVE.	
2 (2DV.2)	Added standards referenced in other National Differences to the list in Clause 2, Normative References. Note that this does not include standards referenced in the Component Annexes (DVE / DVF / DVG).	

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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued on Next Page



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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued

IEC Clause reference (ND reference)	Rationale / Justification	Source
3.3 (3.3DV.1)	Added "telecommunication network" to the alphabetical list of defined terms. (Also see the entry for 3.3.1.3DV.)	
3.3.1.2 (3.3.1.2DV)	Added to reference Annex DVD for additional information regarding D.C. powered equipment and centralized d.c. power systems (DC mains).	
3.3.1.3 (3.3.1.3DV)	See entry for Annex DVI. Definition of telecommunication network added to define the term.	CSA/UL 60950-1, 1.2.13.8
3.3.3.5 (3.3.3.5DV)	Added a note to clarify the types of interfaces that are considered pluggable equipment type A	CSA/UL 60950-1, 1.2.5.1
4.1.1 (4.1.1DV.1)	Some requirements found in UL and CSA standards are considered essential in order to provide an acceptable level of safety in North America. Products within the scope of these requirements must be met. (Also see the entry for Annexes DVE / DVF / DVG.)	
4.1.1 (4.1.1DV.2)	There are many North American standards that apply to whole products and components that are not harmonized with IEC requirements. The use and application of these standards, while inconsistent with the HB approach, should still be considered acceptable. (ex. UL 1310, UL 1778). These "product standards" are too comprehensive to provide a specific reference clause. (Also see the entry for Annexes DVE / DVF / DVG.)	
4.1.2 (4.1.2DV)	The use of CSA/UL component standards is considered acceptable for North American end-products and certification programs. They may also be important in establishing surveillance requirements with some North American certifiers. (Also see the entry for Annexes DVE / DVF / DVG.)	
4.1 (4.1.16DV)	New sub-clause 4.1.16DV.1, Mains connections, added to general requirements sub-clause to better coordinate and communicate where to find requirements for mains connections, both cord connection and permanent connection. Although the scope IEC 62368-1 addresses safety of audio/video (AV) and information technology and communication technology (IT/CT) equipment with a set of requirements based on hazard based safety engineering (HBSE), it does not contain sufficient requirements to allow for a complete investigation of the safety of the equipment's interconnection to the mains when the interconnection is a permanent connection via provision of equipment wiring terminals and junction box (with supply wiring space). This proposal presents requirements that allow for installation of such equipment in Canada and the United States in accordance with the relevant electrical installation codes. IEC 62368-1 does not have a general sub-clause in the body of the standard that serves as a roadmap to correlate where users of the standard can find the appropriate requirements for both permanently connected equipment and equipment utilizing power supply cords. Therefore, it is proposed that material be added to the General Requirements (Clause 4) to accomplish this. This will allow users of the standard to more efficiently locate these requirements. These requirements for permanently connected equipment are proposed in an independent Annex so that manufacturers of such equipment can utilize the requirements efficiently. Since the variety of AV and IT/CT equipment that is permanently connected is diverse, the applicability of the requirements is dependent on the particular construction of the equipment and its intended installation and use. Similarly, the annex is not intended to provide a complete list of all the requirements that may be applicable to all equipment covered by this standard, only those that most commonly apply to this type of equipment. For complete requirements, including valid exceptions, the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part I, or other referenced documents need to also be consulted.	National Electrical Code (NEC), NFPA 70; Canadian Electrical Code (CEC), Part I; Variety of other Regulations and Codes applicable in the U.S. and Canada.

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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued on Next Page



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IEC Clause reference (ND reference)	Rationale / Justification	Source
4.1 (4.1.17DV)	New sub-clause 4.1.17DV.1, External interconnecting cable and wiring, added to general requirements sub-clause to better coordinate and communicate where to find requirements for external cable and wiring, both Code and non-Code based.	Various
4.4.5 (4.4.5DV)	Added to provide a cross-reference to P.4DV , which specifies requirements for the reliability of adhesive products and coatings.	
5.2.2.2 (5.2.2.2DV)	In 5.2.2.2, there is mention of a time of two seconds. It is believed this is to determine whether the voltage or current is a steady state and not whether during the two seconds the voltage or current could be infinite. This needed to be clarified.	IEC 62368-1, proposal for the second edition
5.4.2.1 (5.4.2.1DV)	The separation distances between the voice coil and adjacent conductive parts are considered as an unreliable equipment safeguard as these distances are considered as difficult to control during manufacturing and during normal operating conditions.	IEC/CSA 60065: 13.3.1; IEC 62368-1, proposal for the second edition
5.5.5.1 (5.5.5.1DV)	Currently, IEC 62368-1 does not have criteria for assessing suitability of conductor terminations similar to 3.1.9 of IEC 60950-1. Although there is a proposal to add this material to the second edition of IEC 62368-1, the THC consensus is a National Difference is needed in the interim. Additionally, wire wrap terminals as implemented in U.S. and Canadian telecommunication installations are not designed to withstand a 10 N force. Since a National Difference currently exists in CSA/UL 60950-1 for this construction and there have not been field problems reported with this construction, the THC consensus was to continue to allow this wiring practice.	CSA/UL 60950-1, 3.1.9 and 4.2.2
5.6.6.3 (5.6.3.3DV)	IEC TC108 is planning to revise Tables 35 and 36 of the first edition (Tables 31 and 32 in the second edition), to permit a broader range of equipment to comply with the Annex R limited short circuit test instead of permitting only protective bonding conductors that are not more than one size smaller than required for protective earthing conductors. Because this change provides manufacturers with more design options, the THC consensus was to include a National Difference to provide the updated requirement aligned with what is proposed for the second edition of IEC 62368-1. This also justifies no longer making a reference to CSA 0.4 as a national difference since the revised requirements are closer aligned with this CSA standard too. Replacing 16 A with 20A in the fifth dashed item will correlate with pluggable equipment, type A in North America and the existing NOTE 3.	IEC 62368-1, proposal for the second edition
Table 35 (Table 35DV)	See entry for 5.6.6.3 (5.6.3.3DV).	
Table 36 (Table 36DV)	See entry for 5.6.6.3 (5.6.3.3DV).	
5.7.8.1 (5.7.8.1DV)	The touch current measurement procedure for equipment connected to telecommunication networks with ringing signals and the magnitudes allowed for the measured touch current are more closely specified for the U.S. and Canada.	CSA/UL 60950-1 Section 5.1.8.3
6.4.3.3 (6.4.3.3DV)	UL's history of conducting single fault conditions that result in the immediate (within one second) opening of a UL Certified fuse link have demonstrated that the effectiveness of the fuse link and that additional "worst case" calibration scenario testing is unnecessary in this specific instance (immediate opening of the fuse). In addition, the trinational U.S. / Canada / Mexico fuse Standard (low voltage, supplemental fuses, 248-14) does not contain an equivalent "prearcing time" evaluation and rating.	UL 60065: 11.2.1
6.5.2 (6.5.2DV.1)	In Canada and the U.S., use of conductors with insulation rated VW-1 and FT-1 are considered acceptable alternatives to the flammability requirements in the referenced IEC standards.	CSA/UL 60950-1: 4.7.3.4; UL 60065, 20.1.2

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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued on Next Page



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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued

IEC Clause reference (ND reference)	Rationale / Justification	Source
6.5.2 (6.5.2DV.2)	The first edition of IEC 62368-1 does not contain a similar set of requirements to address suitability of wiring when subjected to short circuit conditions as are included in 3.1.1 of CSA/UL 60950-1. The THC agreed that similar criteria is needed for assessing the suitability of wiring supplied by PS3 when located outside a fire enclosure.	CSA/UL 60950-1: 3.1.1, Annex NAE (3.1.1)
6.8 (6.8DV)	Added reference to Annex DVI for equipment with external circuits intended for connection to a telecommunication network and that may be subject to overvoltage from a power line cross.	CSA/UL 60950-1: 6.4
8.5.5.1 (8.5.5.1DV)	This requirement provides construction specifications of an equipment safeguard for CRT enclosure opening size to protect the user from exposure to glass particles that may be expelled rearward of the CRT face in the event of an implosion.	UL 60065: 18; CSA/UL 60950-1: 4.2.8.1
10.4.1 (10.4.1DV)	Added reference to Annex DVJ for protection of telecommunication-network connected equipment from acoustic energy sources coupled to the ear.	
F.1 (F.1DV)	Added reference to Annex DVK for Canadian and U.S. markings and instructions.	
F.3.3.8 (F.3.3.8DV)	B.3.5, B.4.1, E.2 are clauses that include the term "output terminals". None of these clauses addressed marking the nature of the output supply.	UL 60065 5.2c)
Table G.4 (Table G.4DV)	Since CEC and NEC requirements vary in varying degrees from Table G.4, a new Table G.9A.2 is provided in place of Table G.4.	NEC: 400.5, 400.21(A), Table 400.4, Table 400.5(A)(1). CEC: 4-014, Table 12, 4-012
G.9.1 (G.9.1DV)	The reference to Table G.9ADV.1 covers CEC and NEC code requirements.	UL 60065 Clause 16.2
G.9A (G.9ADV)	Power Supply Cords used on information technology, communications technology and audio/video equipment intended to be installed in Canada and the United States are required to be compatible with the Electrical Codes in both countries that cover such equipment so that when the installation of the equipment is inspected by authorities having jurisdiction (AHJ) there will be no conflict with these applicable Codes. In Canada and the U.S. the applicable electrical codes are Canadian Electrical Code (CEC), CSA C22.1 and the National Electrical Code (NEC), NFPA 70. This proposed Annex contains requirements consistent with the requirements in these Codes, either as specifically stated in the Codes or as determined to meet the intent of the Codes through application experience under CSA C22.2 No. 60065, UL 60065 and CSA/UL 60950-1.	Various references to the NEC, CEC, NFPA 75 and Individual CSA Part II Standards
G.13 (G.13DV)	At the last meeting of TC108, it was agreed to accept the two programs given in Annex CC of Amendment 1 to IEC 60950-1. That means that any of the three programs (one here in 62368-1 and the two in Amendment 1 of IEC 60950-1) can be used to check compliance for the IC current limiters. The acceptance of a single program here will make it harder for the manufacturers to find devices that comply with the program given in IEC 62368-1. Devices complying with the two programs of Amendment 1 to IEC 60950-1 are already available. Therefore, there was agreement to add the following text at the end of G.13: As an alternative, IC current limiters that comply with Annex CC of CSA/UL 60950-1 are also considered acceptable.	CSA/UL 60950-1: Annex CC
G.22 (G.22DV)	The use of the "banana" style receptacle on audio/video equipment has had a long history in the U.S. and Canada. This type of connector used for external wire speaker connections is generally regarded as an Industry Standard component. The concern in (specifically) Europe is with the possible insertion of the Europlug into appropriately spaced equipment mounted banana jacks.	CSA 60065, 15.1.2; UL 60065, 15.1.2

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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued on Next Page



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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued

IEC Clause reference (ND reference)	Rationale / Justification	Source
H.2 (H.2DV)	Characteristics allowed for continuous ringing are more restricted in the U.S. and Canada, and although Method A is more typical of Europe, since global products may be submitted to the Standard, the THC agreed a National Difference is warranted, similar to current M.2 of CSA/UL 60950-1.	CSA/UL 60950-1, M.2
H.4 (H.4DV)	Higher telecommunication voltages for unique short-term telecommunication signaling are allowed in the U.S. and Canada.	CSA/UL 60950-1, M.4
P.4 (P.4DV)	The current Standard does not provide any guidance related to the reliability of adhesive products and coatings, the failure of which may result in arcing due to bridging of parts within a PS2 or PS3 circuit. This is intended to provide a performance test to evaluate safeguard effectiveness. Subclause 17.9A.2 of CAN/CSA C22.2 No. 60065 provides the requirements for the aging test of conductive labels and conductive coatings.	IEC 62368-1, proposal for the second edition; CSA 60065, 17.9A.2; UL 60065, 12.8
(Annex DVA)	See entry for 1 (1DV.1.1, 1DV.1.2, 1DV.1.3).	
(Annex DVB)	See entry for 1 (1DV.2.1).	
(Annex DVC)	See entry for 1 (1DV.2.2).	
(Annex DVD)	Since this material currently is in Annex NAB of CSA/UL 60950-1, the THC agreed that maintaining this informative annex would be useful for users who are unfamiliar with D.C. powered equipment and centralized d.c. power systems (DC mains). It also will help with application of the DC Mains requirements in Annex DVH, Permanently Connected Equipment – Mains Connections.	CSA/UL 60950-1 Annex NAB

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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued on Next Page



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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued

IEC Clause reference (ND reference)	Rationale / Justification	Source
(Annex DVE, Annex DVF, Annex DVG)	The use of CSA/UL component standards needs to address the following: – Requirements associated with regulatory requirements that require compliance with a U.S. or Canadian regulatory requirement (Normative) AND requirements that are considered essential in North America that may not be fully addressed in IEC 62368-1. (Fuses, UL 796, GFCI's) – DR, D1, D2, DC – Replacement of an IEC referenced standard as a alternative to the required IEC standard. This practice is only acceptable (but not required) for compliance in North American. (Example UL 94, material flammability, appliance connector) – DC – Requirements that CSA/UL have captured in CSA/UL component standards which are specifically addressed in IEC 62368-1 but where acceptable alternatives to the constructions described in IEC 62368-1. (Carts and Stands, Direct Plug-In) The new Annexes are intended to capture all the normatively (Annex DVE) and informatively (Annex DVF, Annex DVG) referenced requirements that are generally associated with test methods or component standards in North America. <u>General Approach</u> Mandatory – Mandatory component standards are covered in Annex DVE: UL and CSA Components (Mandatory). These include: • Component standards intended to facilitate National Regulatory Requirements (CEC, NEC) • Component standards containing requirements that have been considered as essential in North America. Alternative - Alternative component standards that are considered acceptable for North American Listing and Certifications will be covered in separate Annexes DVF: UL and CSA Component Requirements (Alternative to IEC standards) and DVG: UL and CSA Component Requirements (Alternative). These include: • Differences considered acceptable in the U.S. and Canada • References to facilitate North American Surveillance Programs	CSA/UL 60950-1 Annex P, P.1 and P.2.

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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued on Next Page



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NATIONAL DIFFERENCES IN CSA/UL 62368-1 Continued

IEC Clause reference (ND reference)	Rationale / Justification	Source
(Annex DVH)	IEC 62368-1 allows for investigation for safety of AV and IT/CT Equipment per its prescriptive performance- and construction-based requirements. The requirements were developed based on HBSE. AV and IT/CT equipment typically need to interconnect with the building wiring/ mains supply system via either (a) power supply cords terminated in a plug or (in countries and regions that permit it) leads intended for permanent connection, or (b) permanent connection via equipment terminals and junction box (with supply wiring space), sometimes called 'hard' or 'field' wiring. The requirements in IEC 62368-1 for cord connection are relatively complete, and the National Differences for Canada and the U.S. are relatively straightforward. However, the requirements for permanent connection via terminals and junction boxes are lacking detail and do not encompass a level of completeness currently covered in Clause 3 of IEC 60950-1. Additional requirements, mostly prescriptive construction-based, are necessary because, although the IEC 62368-1 standard is HBSE-based, the interconnection interfaces between building wiring/mains supply and equipment were not developed using HBSE. The requirements for these interfaces are covered internationally by the IEC 60364-x series standards, Electrical Installation of Buildings, and by other regional codes and standard. In Canada and the U.S., the primary requirements are CSA C22.1, Canadian Electrical Code (CEC), and NFPA 70, the National Electrical Code (NEC), respectively. The references to specific Articles and/or Sections of the CEC and NEC serve as the primary rationale for the contents of this Annex.	CSA/UL 60950-1: Clause 3 and Annex NAE; UL 60065, Annex U
(Annex DVI)	The telecommunication network cabling infrastructure found in the U.S. and Canada often have a parallel run with power lines. Previously, under CSA/UL 60950-1 significant effort was undertaken to develop appropriate construction and performance options for safeguarding equipment against power line crosses on telecommunication lines. THC consensus was that these requirements should remain as U.S. and Canadian National Differences.	CSA/UL 60950-1, Section 6.4, Figure 6C, and Annex NAC
(Annex DVJ)	Although 10.4 of IEC 62368-1 begins to address protection from acoustic energy sources associated with MP3 players and similar portable devices, it does not include requirements for acoustic safety associated with telecommunications equipment, such as telephones. This annex is based on the latest proposal for the acoustic requirements in CSA/UL 60950-1.	CSA/UL 60950-1, Annex NAD
(Annex DVK)	Marking details and examples relative to National Differences in other parts of the Standard, and typically based on published Regulations and Codes in Canada and the U.S., are provided within this Annex. There was consensus within the THC to present the additional marking details in the form of a Normative Annex, similar to in format to Annex NAA of CSA/UL 60950-1. A single reference within Annex F.1 will point the user of this standard to this Marking Annex.	CSA/UL 60950-1, Annex NAA

Comments directed at revising the base IEC text should be presented as new National Differences, including identification of the National Difference type and supporting Rationale. The THC response to such comments may be that such changes should be pursued at the IEC level, by proposing to change the base IEC Standard via the appropriate National Committee. This is the approach commonly taken by the THC as well, again to try to minimize the number of national differences and improve the overall IEC standard.

The National Difference Page and the IEC Foreword and Introduction have been provided for your reference in reviewing this document. However, they are not considered to be part of the ANSI balloted material.

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Please note this document uses the standard formatting for National Differences. The specialized formats previously used in UL 60065 and UL 60950-1, where the National Differences were shown ~~lined-out~~ and underlined, are not used in UL 62368-1. Also note that the proposals are not formatted exactly as they will be when published as part of the Standard. The font or format of notes, headings and the Table of Contents may be different.

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Documents
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CONTENTS

NATIONAL DIFFERENCES	28
FOREWORD	29
INTRODUCTION	32
1 Scope	49
1DV.4.1 Power Distribution Equipment and Sub-Assemblies	51
2 Normative references	52
3 Terms, definitions and abbreviations	63
3.1 General	63
3.2 Terms and abbreviations	64
3.2.1 Terms in alphabetical order	64
3.2.2 Abbreviations in alphabetical order	64
3.3 Terms and definitions	65
3.3.1 Circuit terms	67
3.3.2 Enclosure terms	68
3.3.3 Equipment terms	68
3.3.4 Flammability terms	69
3.3.5 Insulation	70
3.3.6 Miscellaneous	71
3.3.7 Operating and fault conditions	72
3.3.8 Persons	73
3.3.9 Potential ignition sources	73
3.3.10 Ratings	73
3.3.11 Safeguards	74
3.3.12 Spacings	75
3.3.13 Temperatures and controls	75
3.3.14 Voltages and currents	76
3.3.15 Classes of equipment with respect to protection from electric shock	77
3.3.16 Chemical terms	77
4 General requirements	78
4.1 General	78
4.1.1 Application of requirements and acceptance of materials, components and subassemblies	78
4.1.2 Use of components	79
4.1.3 Equipment design and construction	80
4.1.4 Equipment installation	80
4.1.5 Constructions not specifically covered	80
4.1.6 Orientation during transport and use	80
4.1.7 Choice of criteria	81
4.1.8 Conductive liquids	81
4.1.9 Electrical measuring instruments	81
4.1.10 Temperature measurements	81
4.1.11 Steady state conditions	81
4.1.12 Hierarchy of safeguards	82
4.1.13 Examples mentioned in the standard	82
4.1.14 Tests on parts or samples separate from the end-product	82
4.1.15 Markings and instructions	82
4.1.16DV.1 Mains connections	82

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

4.1.17DV.1	External interconnecting cable and wiring	83
4.1.17DV.1.1	General	83
4.1.17DV.1.2	Equipment (system) interconnecting cable and wiring	83
4.1.17DV.1.3	External interconnecting cable and wiring considered part of the building installation	84
4.2	Energy source classifications	84
4.2.1	Class 1 energy source	84
4.2.2	Class 2 energy source	85
4.2.3	Class 3 energy source	85
4.2.4	Energy source classification by declaration	85
4.3	Protection against energy sources	85
4.3.1	General	85
4.3.2	Safeguards for protection of an ordinary person	86
4.3.3	Protection of an instructed person	89
4.3.4	Protection of a skilled person	92
4.3.5	Safeguards in a restricted access area	96
4.4	Safeguards	96
4.4.1	General	96
4.4.2	Equivalent materials or components	97
4.4.3	Composition of a safeguard	97
4.4.4	Accessible parts of a safeguard	97
4.4.5	Safeguard robustness	100
4.4.6	Air comprising a safeguard	101
4.5	Explosion	101
4.5.1	General	101
4.5.2	Requirements	101
4.5.3	Compliance	102
5	Electrically-caused injury	102
5.1	General	102
5.2	Classification and limits of electrical energy sources	102
5.2.1	Electrical energy source classifications	102
5.2.2	ES1, ES2 and ES3 limits	103
5.3	Protection against electrical energy sources	110
5.3.1	General	110
5.3.2	Protection of an ordinary person	111
5.3.3	Protection of an instructed person	111
5.3.4	Protection of a skilled person	112
5.3.5	Safeguards between energy sources	112
5.3.6	Accessibility to electrical energy sources and safeguards	116
5.4	Insulation materials and requirements	119
5.4.1	General	119
5.4.2	Clearances	126
5.4.3	Creepage distances	141
5.4.4	Solid insulation	144
5.4.5	Antenna terminal insulation	155
5.4.6	Insulation of internal wire as a part of a supplementary safeguard	156
5.4.7	Thermal cycling test procedure	157
5.4.8	Test for pollution degree 1 environment and for an insulating compound	157
5.4.9	Tests for semiconductor components and for cemented joints	158
5.4.10	Humidity conditioning	158
5.4.11	Electric strength test	158
5.4.12	Protection against transient voltages from external circuits	162
5.4.13	Separation between external circuits and earth	163

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents

Document Sharing Hub

5.5	Components as safeguards	165
5.5.1	General	165
5.5.2	Components as basic safeguard and supplementary safeguard	166
5.5.3	Components as a reinforced safeguard	169
5.5.4	Insulation between the mains and an external circuit consisting of a coaxial cable	171
5.5.5	Components and parts that may bridge insulation	171
5.6	Protective conductor	172
5.6.1	General requirements	172
5.6.2	Corrosion	173
5.6.3	Colour of insulation	173
5.6.4	Test for low current-carrying protective conductors	174
5.6.5	Protective conductors used as a basic safeguard between ES1 and ES2	174
5.6.6	Protective conductors used as a supplementary safeguard	175
5.6.7	Protective earthing conductors serving as a double or reinforced safeguard ..	181
5.6.8	Reliable earthing	183
5.7	Prospective touch voltage, touch current and protective conductor current	184
5.7.1	General	184
5.7.2	Measuring devices and networks	184
5.7.3	Equipment set-up, supply connections and earth connections	184
5.7.4	Unearthed conductive accessible parts	185
5.7.5	Earthed accessible conductive parts	186
5.7.6	Protective conductor current	186
5.7.7	Prospective touch voltage and touch current due to external circuits	186
5.7.8	Summation of touch currents from external circuits	187
5.7.8.1DV.1	Limitation of touch current due to ringing signals	188
6	Electrically-caused fire	190
6.1	General	190
6.2	Classification of power sources (PS) and potential ignition sources (PIS)	190
6.2.1	General	190
6.2.2	Power source circuit classifications	191
6.2.3	Classification of potential ignition sources	196
6.3	Safeguards against fire under normal operating conditions and abnormal operating conditions	197
6.3.1	Requirements	197
6.3.2	Compliance	198
6.4	Safeguards against fire under single fault conditions	198
6.4.1	General	198
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits ..	199
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 circuits and PS3 circuits	199
6.4.4	Control of fire spread in PS1 circuits	201
6.4.5	Control of fire spread in PS2 circuits	201
6.4.6	Control of fire spread in a PS3 circuit	202
6.4.7	Separation of combustible materials from a PIS	203
6.4.8	Fire enclosures and fire barriers	208
6.5	Internal and external wiring	214
6.5.1	General	214
6.5.2	Requirements	214
6.5.3	Compliance	215
6.5.4	Requirements for interconnection to building wiring.	215
6.5.5	Compliance	216
6.6	Likelihood of fire due to entry of foreign objects	216
6.7	Safeguards against fire due to the connection of secondary equipment	216

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents

Document Sharing Hub

6.8DV.1 Safeguards against electrically-caused fire due to overvoltage from power line crosses	216
7 Chemically-caused injury	217
7.1 General	217
7.2 Reduction of exposure to hazardous chemicals	217
7.3 Ozone exposure	217
7.4 Use of PPE	217
7.5 Use of instructional safeguards and instructions	218
7.6 Batteries	218
8 Mechanically-caused injury	218
8.1 General	218
8.2 Mechanical energy source classifications	218
8.2.1 General classification	218
8.2.2 MS1	220
8.2.3 MS2	220
8.2.4 MS3	221
8.3 Protection against mechanical energy sources	221
8.3.1 General	221
8.3.2 Protection of ordinary persons	221
8.3.3 Protection of instructed person	222
8.3.4 Protection of skilled persons	222
8.4 Safeguards against parts with sharp edges and corners	222
8.4.1 Requirements	222
8.4.2 Instructional safeguard	222
8.4.3 Compliance	223
8.5 Safeguards against moving parts	223
8.5.1 Requirements	223
8.5.2 MS2 or MS3 part required to be accessible for the function of the equipment	224
8.5.3 Compliance	224
8.5.4 Special categories of equipment comprising moving parts	225
8.5.5 Protection of persons against loosening, exploding or imploding parts	227
8.6 Stability of equipment	231
8.6.1 Requirements	231
8.6.2 Static stability for floor standing equipment	232
8.6.3 Non-floor standing equipment having controls that are accessed during normal use or having displays with moving images	233
8.7 Equipment mounted to a wall or ceiling	234
8.7.1 General	234
8.7.2 Test method	235
8.7.3 Compliance	235
8.8 Handle strength test method	235
8.8.1 General	235
8.8.2 Compliance and test method	235
8.9 Wheels or casters attachment requirements	236
8.9.1 General	236
8.9.2 Test method	236
8.10 Carts, stands, and similar carriers	236
8.10.1 General	236
8.10.2 Marking and instructions	237
8.10.3 Cart, stand or carrier loading test and compliance	237
8.10.4 Cart, stand or carrier impact test	238
8.10.5 Mechanical stability	238
8.10.6 Thermoplastic temperature stability	238

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

8.11	Mounting means for rack mounted equipment	239
8.11.1	Requirements	239
8.11.2	Mechanical strength test, variable N	239
8.11.3	Mechanical strength test, 250 N, including end stops	240
8.11.4	Compliance	240
8.12	Telescoping or rod antennas	240
9	Thermal burn injury	240
9.1	General	240
9.2	Thermal energy source classifications	241
9.2.1	General	241
9.2.2	TS1	241
9.2.3	TS2	241
9.2.4	TS3	241
9.2.5	Touch temperature levels	242
9.3	Protection against thermal energy sources	243
9.3.1	General	243
9.3.2	Protection of an ordinary person	243
9.3.3	Protection of an instructed person	244
9.3.4	Protection of a skilled person	244
9.4	Requirements for safeguards	244
9.4.1	Equipment safeguard	244
9.4.2	Instructional safeguard	245
10	Radiation	245
10.1	General	245
10.2	Radiation energy source classifications	246
10.2.1	RS1	246
10.2.2	RS2	246
10.2.3	RS3	246
10.3	Requirements for electromagnetic radiation	246
10.3.1	Protection of persons from non-ionising radiation	246
10.3.2	Non-ionizing radiation from radio frequencies in the range 0 Hz to 300 GHz	252
10.3.3	Protection of persons from ionizing radiation (X-radiation)	252
10.3.4	Protection of materials from lamps that produce UV radiation	254
10.4	Protection against acoustic energy sources	255
10.4.1	General	255
10.4.2	Requirements	255
10.4.3	Protection of ordinary persons	255

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

Annex A (informative)

Examples of equipment within the scope of this standard

Annex B (normative)

Normal operating condition tests, abnormal operating condition tests and single fault condition tests

B.1	General	257
B.1.1	Introduction	257
B.1.2	Test applicability	257
B.1.3	Type of test	257
B.1.4	Test samples	257
B.1.5	Measurement of voltages to earth	258
B.1.6	Compliance by inspection of relevant data	258
B.1.7	Temperature measurement conditions	258
B.2	Normal operating conditions	258
B.2.1	General	258
B.2.2	Supply frequency	259
B.2.3	Supply voltage	259
B.2.4	Normal operating voltages	260
B.2.5	Input test	260
B.2.6	Operating temperature measurement conditions	261
B.2.6.1	General	261
B.2.6.2	Operating temperature dependent heating/cooling	261
B.2.6.3	Operating temperature independent heating/cooling	262
B.2.7	Battery charging under normal operating conditions	262
B.3	Simulated abnormal operating conditions	262
B.3.1	General	262
B.3.2	Covering of ventilation openings	263
B.3.3	DC mains polarity test	263
B.3.4	Setting of voltage selector	263
B.3.5	Maximum load at output terminals	263
B.3.6	Reverse battery polarity	263
B.3.7	Audio amplifier abnormal operating conditions	264
B.3.8	Compliance during and after abnormal operating conditions	264
B.4	Simulated single fault conditions	264
B.4.1	General	264
B.4.2	Temperature controlling device	265
B.4.3	Motor tests	265
B.4.3.1	Blocked motor test	265
B.4.3.2	Compliance	265
B.4.4	Short circuit of functional insulation	265
B.4.4.1	Short circuit of clearances for functional insulation	265
B.4.4.2	Short circuit of creepage distances for functional insulation	265
B.4.4.3	Short circuit of functional insulation on coated printed boards	266
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors	266
B.4.6	Short circuit or disconnection of passive components	266
B.4.7	Continuous operation of components	267

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

B.4.8 Compliance during and after single fault conditions	267
B.4.9 Battery charging under single fault conditions	267

Annex C (normative)

UV radiation

C.1 Protection of materials in equipment from UV radiation	268
C.1.1 General	268
C.1.2 Requirements	268
C.1.3 Test method	269
C.2 UV light conditioning test	269
C.2.1 Test apparatus	269
C.2.2 Mounting of test samples	269
C.2.3 Carbon-arc light-exposure test	270
C.2.4 Xenon-arc light-exposure test	270

Annex D (normative)

Test generators

D.1 Impulse test generators	271
D.2 Antenna interface test generator	272
D.3 Electronic pulse generator	273

Annex E (normative)

Test conditions for equipment containing audio amplifiers

E.1 Audio amplifier normal operating conditions	275
E.2 Audio amplifier abnormal operating conditions	277

Annex F (normative) Equipment markings, instructions, and instructional safeguards

F.1 General	278
F.2 Letter symbols and graphical symbols	278
F.2.1 Letter symbols	278
F.2.2 Graphical symbols	279
F.2.3 Compliance	279
F.3 Equipment markings	279
F.3.1 Equipment marking locations	279
F.3.2 Equipment identification markings	280
F.3.2.1 Manufacturer identification	280
F.3.2.2 Model identification	280
F.3.2.3 Compliance	280
F.3.3 Equipment rating markings	280

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

F.3.3.1	Equipment without direct connection to mains	280
F.3.3.2	Nature of the supply voltage	280
F.3.3.3	Rated voltage	280
F.3.3.4	Rated frequency	281
F.3.3.5	Rated current or rated power	281
F.3.3.6	Equipment with multiple supply connections	282
F.3.3.7	Compliance	282
F.3.3.8DV.1	Equipment with output terminals	282
F.3.4	Voltage setting device	282
F.3.5	Terminals and operating devices	283
F.3.5.1	Mains appliance outlet and socket-outlet markings	283
F.3.5.2	Switch position identification marking	283
F.3.5.3	Replacement fuse identification and rating markings	283
F.3.5.4	Replacement battery identification marking	284
F.3.5.5	Compliance	284
F.3.6	Equipment markings related to equipment classification	284
F.3.6.1	Class I equipment	284
F.3.6.2	Class II equipment	285
F.3.6.3	Compliance	285
F.3.7	Equipment IP rating marking	285
F.3.8	Durability, legibility and permanence of markings	285
F.3.9	Test for the permanence of markings	286
F.3.9.1	General	286
F.3.9.2	Testing procedure	286
F.3.9.3	Petroleum spirit	286
F.3.9.4	Compliance	286
F.4	Instructions	286
F.5	Instructional safeguards	287

Annex G (normative)

Components

G.1	Switches	291
G.1.1	General	291
G.1.2	Requirements for switches	291
G.1.3	Test method	292
G.1.4	Compliance	292
G.2	Thermal cut-offs	292
G.2.1	Requirements for thermal cut-offs	292
G.2.2	Test method	294
G.2.3	Compliance	294
G.3	Thermal links	294
G.3.1	Requirements for thermal links	294
G.3.2	Compliance and test method	295
G.4	PTC thermistors	295
G.5	Overcurrent protective devices	295
G.6	Protective devices not mentioned in Clauses G.2 to G.5	295
G.6.1	Other protective devices requirements	295
G.6.2	Compliance and test method	296
G.7	Transformers	296

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

G.7.1	General	296
G.7.2	Insulation	297
G.7.2.1	Requirements	297
G.7.2.2	Compliance criteria	298
G.7.3	Transformer overload tests	298
G.7.3.1	Test conditions	298
G.7.3.2	Compliance	298
G.7.3.3	Alternative test method	300
G.8	Motors	301
G.8.1	General requirements	301
G.8.2	Motor overload test conditions	301
G.8.3	Running overload test	302
G.8.4	Locked-rotor overload test	302
G.8.5	Running overload test for d.c. motors	303
G.8.5.1	Requirement	303
G.8.5.2	Test method	303
G.8.5.3	Alternative test method	303
G.8.5.4	Electric strength test	304
G.8.6	Locked-rotor overload test for d.c. motors	304
G.8.6.1	Requirement	304
G.8.6.2	Test method	304
G.8.6.3	Alternative test method	304
G.8.7	Compliance	304
G.8.7.1	Electric strength test	304
G.8.7.2	Maximum temperatures	305
G.8.8	Compliance and test method for motors with capacitors	305
G.8.9	Compliance and test method for three-phase motors	305
G.8.10	Compliance and test method for series motors	306
G.9	Mains supply cords	306
G.9.1	General	306
G.9.2	Compliance and test method	308
G.9.3	Cord anchorages and strain relief for non-detachable power supply cords	308
G.9.3.1	General	308
G.9.3.2	Cord strain relief	308
G.9.4	Cord entry	310
G.9.5	Non-detachable cord bend protection	310
G.9.5.1	Requirements	310
G.9.5.2	Compliance and test method	311
G.9.6	Cord replacement	311
G.9.7	Supply wiring space	311
G.9.7.1	General requirements	311
G.9.7.2	Stranded wire	312
G.9ADV.1	General	313
G.9ADV.2	Methods of connection	313
G.9ADV.3	Sizing and ratings	313
G.9ADV.4	Serviceability	314
G.9ADV.5	Length	315
G.9ADV.5.1	Minimum length	315
G.9ADV.5.2	Maximum length	316
G.10	Metal Oxide Varistors	316
G.10.1	General	316
G.10.2	Basic safeguard	316
G.10.3	Supplementary safeguards	317

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents

Document Sharing Hub

G.10.3.1 General	317
G.10.3.2 Sudden failure	317
G.10.3.3 Gradual failure	317
G.11 Wound components	318
G.11.1 Wire insulation in wound components	318
G.11.1.1 General	318
G.11.1.2 Solvent-based enamel winding insulation	319
G.11.1.3 Protection against mechanical stress in wound components	320
G.11.1.4 Compliance and test method	320
G.11.2 Additional insulation in wound components	320
G.11.2.1 General requirements	320
G.11.2.2 Compliance and test method	321
G.11.3 Endurance test on wound components	321
G.11.3.1 General test requirements	321
G.11.3.2 Compliance	321
G.11.3.3 Heat run test	321
G.11.3.4 Vibration test	322
G.11.3.5 Wound components supplied from the mains	322
G.12 Circuits generating starting pulses	322
G.12.1 Insulation in circuits generating starting pulses	322
G.12.2 Clearances in circuits generating starting pulses	323
G.13 IC current limiters	323
G.14 Test for resistors serving as safeguard	324
G.14.1 General	324
G.14.2 Resistor test	325
G.14.3 Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable	325
G.14.3.1 General	325
G.14.3.2 Voltage surge test	326
G.14.3.3 Impulse test	326
G.14.3.4 Compliance	326
G.15 Capacitors and RC units serving as safeguards bridging insulation	326
G.15.1 General	326
G.15.2 Conditioning of capacitors and RC units	326
G.15.3 Rules for selecting capacitors	327
G.15.4 Informative examples of the application of capacitors	328
G.16 Optocouplers as safeguards	330
G.17 Relays	330
G.17.1 General	330
G.17.2 Requirements for relays	331
G.17.3 Overload test	332
G.17.4 Electric strength test	332
G.17.5 Relay controlling mains socket-outlets	332
G.17.6 Test method	332
G.17.7 Compliance	332
G.18 Printed boards	332
G.18.1 General	332
G.18.2 Uncoated printed boards	333
G.18.3 Coated printed boards	333
G.18.4 Insulation between conductors on the same inner surface	335
G.18.5 Insulation between conductors on different surfaces	335
G.18.6 Tests on coated printed boards	335
G.18.6.1 Sample preparation and preliminary inspection	335

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents

Document Sharing Hub

G.18.6.2 Thermal conditioning	336
G.18.6.3 Electric strength test	336
G.18.6.4 Abrasion resistance test	337
G.19 Coatings on component terminals	338
G.19.1 Requirements	338
G.19.2 Compliance and test method	338
G.20 Mains connectors	338
G.21 Liquid filled components	338
G.21.1 General	338
G.21.2 Requirements	339
G.21.3 Compliance and test methods	339
G.21.3.1 Hydrostatic pressure test	339
G.21.3.2 Creep resistance test	340
G.21.3.3 Tubing and fittings compatibility test	340
G.21.3.4 Vibration test	340
G.21.3.5 Thermal cycling test	340
G.21.3.6 Force test	340
G.21.4 Compliance	341
G.22 Connectors other than mains connectors	341

Annex H (normative) Criteria for telephone ringing signals

H.1 General	342
H.2 Method A	342
H.3 Method B	346
H.3.1 Ringing signal	346
H.3.1.1 Frequency	346
H.3.1.2 Voltage	347
H.3.1.3 Cadence	347
H.3.1.4 Single fault current	347
H.3.2 Tripping device and monitoring voltage	347
H.3.2.1 Conditions for use of a tripping device or a monitoring voltage	347
H.3.2.2 Tripping device	348
H.3.2.3 Monitoring voltage	348
H.4DV.1 Other telecommunication signals	348

Annex I (informative) Overvoltage categories (see IEC 60364-4-44)

Annex J (normative) Insulated winding wires for use without interleaved insulation

J.1 General	352
J.2 Sampling tests	352
J.2.1 General	352
J.2.2 Electric strength	352
J.2.3 Flexibility and adherence	352
J.2.4 Heat shock	353
J.2.5 Retention of electric strength after bending	354
J.3 Testing during manufacturing	354
J.3.1 General	354
J.3.2 Routine test	354

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

J.3.3 Sampling test	355
---------------------------	-----

Annex K (normative) Safety interlocks

K.1 General	356
K.1.1 General requirements	356
K.1.2 Compliance and test method	356
K.2 Components of the safety interlock safeguard mechanism	356
K.3 Inadvertent change of operating mode	356
K.4 Interlock safeguard override	357
K.5 Fail-safe	357
K.5.1 Requirement	357
K.5.2 Compliance and test method	357
K.6 Mechanically operated safety interlocks	357
K.6.1 Endurance requirement	357
K.6.2 Compliance and test method	358
K.7 Interlock circuit isolation	358
K.7.1 Separation distances for contact gaps and interlock circuit elements	358
K.7.2 Overload test	359
K.7.3 Endurance test	359
K.7.4 Electric strength test	359

Annex L (normative) Disconnect devices

L.1 General requirements	360
L.1.1 General	360
L.1.2 Permanently connected equipment	361
L.1.3 Parts that remain energised	361
L.1.4 Single phase equipment	361
L.1.5 Three-phase equipment	361
L.1.6 Switches as disconnect devices	362
L.1.7 Plugs as disconnect devices	362
L.1.8 Multiple power sources	362
L.2 Compliance	362

Annex M (normative) Batteries and fuel cells

M.1 General requirements	363
M.2 Safety of battery cells and batteries	363
M.2.1 Requirements	363
M.2.2 Compliance and test method	364
M.3 Protection in battery circuits	364
M.3.1 Requirements	364
M.3.2 Test method	365
M.3.3 Compliance	366
M.4 Endurance of a battery and its enclosure	366
M.4.1 Requirements	366
M.4.2 Compliance and test method	367
M.5 Risk of burn due to short circuit during carrying	367
M.5.1 Requirements	367

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

M.5.2 Compliance and test method	367
M.6 Prevention of short circuits and protection from other effects of electric current	367
M.6.1 Short circuits	367
M.6.1.1 General requirements	367
M.6.1.2 Test method to simulate an internal fault	368
M.6.1.3 Compliance	368
M.6.2 Leakage currents	368
M.7 Risk of explosion from lead acid and NiCd batteries	368
M.7.1 Ventilation preventing explosive gas concentration	368
M.7.2 Compliance and test method	369
M.8 Protection against internal ignition from external spark sources of lead acid batteries	370
M.8.1 General	370
M.8.2 Test method	371
M.8.2.1 General	371
M.8.2.2 Estimation of hypothetical volume V_z	372
M.8.2.3 Correction factors	372
M.8.2.4 Calculation of distance d	373
M.9 Preventing electrolyte spillage	375
M.9.1 Protection from electrolyte spillage	375
M.9.2 Tray for preventing electrolyte spillage	375
M.10 Instructions to prevent reasonably foreseeable misuse	375

Annex N (normative) Electrochemical potentials

Annex O (normative) Measurement of creepage distances and clearances

Annex P (normative) Safeguards against entry of foreign objects, foreign liquids, and spillage of internal liquids

P.1 General	390
P.2 Safeguards against entry of solid foreign objects	390
P.2.1 Top and side openings	390
P.2.2 Transportable equipment	394
P.2.2.1 Openings in transportable equipment provided with energy storage devices, such as batteries	394
P.2.2.2 Transportable equipment without batteries and having accessible floating conductive parts	394
P.2.2.3 Openings in transportable equipment in relation to metallized plastic parts of a barrier or enclosure	395
P.3 Safeguards against spillage of internal liquids	395
P.3.1 General	395
P.3.2 Determination of spillage consequences	396
P.4DV.1 Adhesive securement and conductive coatings	396
P.4DV.1.1 Adhesive securement	396
P.4DV.1.2 Metalized coatings and adhesives securing parts	397

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NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

Annex Q (normative) Interconnection with building wiring

Q.1 Limited power source	400
Q.2 Compliance and test method	400
Q.3 Test for external circuits – paired conductor cable	401

Annex R (normative) Limited short-circuit test

R.1 General	403
R.2 Determination of the overcurrent protective device and circuit	403
R.3 Test method	403
R.4 Compliance	404

Annex S (normative) Tests for resistance to heat and fire

S.1 Flammability test for fire enclosure and fire barrier materials of equipment where the steady-state power does not exceed 4 000 W	405
S.2 Flammability test for fire enclosure and fire barrier integrity	406
S.3 Flammability tests for the bottom of a fire enclosure	407
S.3.1 Mounting of samples	407
S.3.2 Compliance and test method	407
S.4 Flammability classification of materials	407
S.5 Flammability test for fire enclosure materials of equipment with a steady-state power exceeding 4 000 W	408

Annex T (normative) Mechanical strength tests

T.1 General	410
T.2 Steady force test, 10 N	410
T.3 Steady force test, 30 N	410
T.4 Steady force test, 100 N	410
T.5 Steady force test, 250 N	410
T.6 Enclosure impact test	410
T.7 Drop test	412
T.8 Stress relief test	413
T.9 Glass breakage	413
T.9.1 General	413
T.9.2 Impact test and compliance	414
T.9.3 Fragmentation test and compliance	414
T.10 Test for telescoping or rod antennas	415

Annex U (normative) Mechanical strength of CRTs and protection against the effects of implosion

U.1 General	416
U.2 Compliance and test method for non-intrinsically protected CRTs	416
U.3 Protective screen	417

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents

Document Sharing Hub

Annex V (normative) Determination of accessible parts

V.1 Accessible parts of equipment	418
V.1.1 General	418
V.1.2 Test method 1 – Surfaces and openings tested with jointed test probes	418
V.1.3 Test method 2 – Openings tested with straight unjointed test probes	419
V.1.4 Test method 3 – Plugs, jacks, connectors	422
V.1.5 Test method 4 – Slot openings	422
V.1.6 Test method 5 – Terminals intended to be used by an ordinary person	424
V.2 Accessible part criterion	424

Annex W (informative) Comparison of terms introduced in this standard

W.1 General	425
W.2 Comparison of terms	425

Bibliography**Annex DVA (normative) Canadian and U.S. regulatory-based requirements****Annex DVB (normative) Equipment used in Health Care Facilities**

DVB.1 General	450
DVB.2 Terms and definitions	450
DVB.3 Electrically-caused injury	450
DVB.3.1 Protective conductor – unearthed accessible conductive surfaces	450
DVB.3.2 Unearthed (isolated) parts marking	451
DVB.3.3 Prospective touch current	451
DVB.3.4 Cleaning and disinfecting	451
DVB.3.5 Immersion	452
DVB.4 Mechanically caused injury – Wheels and casters	452
DVB.4.1 Requirements	452
DVB.4.2 Compliance	453
DVB.5 Thermal burn injury	453
DVB.5.1 Normal temperature test	453
DVB.5.2 Compliance	453
DVB.6 Operation and installation instructions	453
DVB.6.1 Requirements	453
DVB.6.2 Compliance	453
DVB.7 Flexible cord	453
DVB.7.1 Requirements	453
DVB.7.2 Compliance	454
DVB.8 Hospital grade attachment plug	454
DVB.8.1 Requirements	454
DVB.8.2 Compliance	454
DVB.9 Disconnect devices – All-poles switch	454
DVB.9.1 Requirements	454
DVB.9.2 Compliance	454

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Documents
Document Sharing Hub

Annex DVC (normative) Under Kitchen Cabinet Equipment

DVC.1 General	455
DVC.2 Terms and definitions	455
DVC.3 Electrically-caused injury – insulation materials and requirements	455
DVC.3.1 Undercabinet increased moisture test	455
DVC.3.2 Protection of mains supply cords – external flexible cord routing	456
DVC.4 Safeguards against fire under normal operating conditions – operation and installation instructions	456
DVC.4.1 Requirements	456
DVC.4.2 Compliance	456
DVC.5 Normal operating conditions	456
DVC.5.1 Simulated installation	456
DVC.5.2 Undercabinet elevated ambient test	457

Annex DVD (informative) D.C. powered equipment and centralized d.c. power systems (DC mains)

DVD.1 System descriptions	459
---------------------------------	-----

Annex DVE (normative) UL and CSA Component Requirements (Mandatory)**Annex DVF (normative) UL and CSA Component Requirements (Alternative to IEC standards)****Annex DVG (normative) UL and CSA Component Requirements (Alternative)****Annex DVH (normative) Permanently Connected Equipment – Mains Connections****Annex DVI (normative) Safeguards against electrically-caused fire due to overvoltage from power line crosses**

DVI.1 General	494
DVI.2 Equipment evaluation – performance	498
DVI.3 Test set-up	498
DVI.3.1 Equipment	498
DVI.3.2 Wiring connections	498
DVI.3.3 Wiring simulator	499
DVI.4 Test conditions	499
DVI.4.1 General conditions	499
DVI.4.2 Special conditions	502
DVI.4.3 Tests	503
DVI.5 Compliance	504

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
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Documents
Document Sharing Hub

Annex DVJ (normative) Acoustic Tests for Telecommunications Equipment

DVJ.1 General	505
DVJ.2 Definitions	505
DVJ.3 Acoustic pressure limiting	506
DVJ.4 Short-duration impulses	507
DVJ.4.1 Method 1 (recommended method)	510
DVJ.4.2 Method 2 (alternative method)	510
DVJ.5 Long-duration disturbances	511
DVJ.5.1 Method 1 (recommended method)	513
DVJ.5.2 Method 2 (alternative method)	513

Annex DVK (normative) Canadian and U.S. marking and instructions

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NATIONAL DIFFERENCES

GENERAL

National Differences from the text of International Electrotechnical Commission (IEC) Publication 62368-1, Audio/video, information and communication technology equipment – Part 1: Safety requirements copyright 20101 are indicated by notations (differences) and are presented in bold text.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are national differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

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Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

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Safety requirements****FOREWORD**

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and nongovernmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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International Standard IEC 62368-1 has been prepared by TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology.

The text of this standard is based on the following documents:

FDIS	Report on voting
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Table Continued

108/325/FDIS	108/355/RVD
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Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

Except for text preceded by “Note”, all text within a normative figure, or in a box under a normative table, is also normative. Text with a superscript reference is linked to a particular item in the table. Other text in a box under a table applies to the whole table.

Informative annexes and text beginning with the word “NOTE” are not normative. They are provided only to give additional information.

The “in some countries” notes regarding differing national practices are contained in the following subclauses:

0.2. 1, 4.1.15, 5.4.2.4.3, 5.4.2.9, 5.4.5.1, 5.5.2.2, 5.5.2.7, 5.7.7, 10.3.2, 10.3.3.3, 10.3.3.4, 10.4.1, F.3.3.5, Table 15 and Table 16.

In this standard, the following print types or formats are used:

- requirements proper and normative annexes: in roman type;
- compliance statements and test specifications: *in italic type*;
- notes/explanatory matter: in smaller roman type;
- normative conditions within tables: in smaller roman type;
- terms that are defined in 3.3: **bold**.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under “<http://webstore.iec.ch>” in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

NOTE 1 The attention of National Committees and National bodies who prepare national standards is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests. It is the recommendation of TC108 that the content of this publication be adopted for mandatory implementation nationally not earlier than five years from the date of publication of this standard.

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NOTE 2 IEC 62368-1 is based on the principles of hazard based safety engineering, which is a different way of developing and specifying safety considerations than that of the current practice. While this standard is different from traditional IEC safety standards in its approach and while it is believed that IEC 62368-1 provides a number of advantages, its introduction and evolution is not intended to result in significant changes to the existing safety philosophy that led to the development of the safety requirements contained in IEC 60065 and IEC 60950-1. The predominant reason behind the creation of IEC 62368-1 is to simplify the problems created by the merging of the technologies of ITE and CE. The techniques used are novel so that a learning process is required and experience is needed in its application. Consequently, IEC/TC108 recommends that the first edition of this standard be considered as an alternative to IEC 60065 or IEC 60950-1 at least over the recommended transition period.

NOTE 3 Explanatory information related to IEC 62368-1 will be published as IEC/TR 62368-2. It will contain rationale together with explanatory information related to this standard.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

0 Principles of this product safety standard

0.1 Objective

This International Standard is a product safety standard that classifies energy sources, prescribes **safeguards** against those energy sources, and provides guidance on the application of, and requirements for those **safeguards**.

The prescribed **safeguards** are intended to reduce the likelihood of pain, injury and, in the case of fire, property damage.

The objective of the INTRODUCTION is to help designers to understand the underlying principles of safety in order to design safe equipment. These principles are informative and not an alternative to the detailed requirements of this standard.

0.2 Persons

0.2.1 General

This standard describes **safeguards** for the protection of three kinds of persons: the **ordinary person**, the **instructed person**, and the **skilled person**. This standard assumes that a person will not intentionally create conditions or situations that could cause pain or injury.

NOTE In Australia, the work conducted by an **instructed person** or **skilled person** may require formal licensing from regulatory authorities.

0.2.2 Ordinary person

Ordinary person is the term applied to all persons other than **instructed persons** and **skilled persons**. **Ordinary persons** include not only users of the equipment, but also all persons who may have access to the equipment or who may be in the vicinity of the equipment. Under **normal operating conditions** or **abnormal operating conditions**, **ordinary persons** should not be exposed to parts comprising energy sources capable of causing pain or injury. Under a **single fault condition**, **ordinary persons** should not be exposed to parts comprising energy sources capable of causing injury.

0.2.3 Instructed person

Instructed person is a term applied to persons who have been instructed and trained by a **skilled person**, or who are supervised by a **skilled person**, to identify energy sources that may cause pain (see Table 1) and to take precautions to avoid unintentional contact with or exposure to those energy sources. Under **normal operating conditions**, **abnormal operating conditions** or **single fault conditions**, **instructed persons** should not be exposed to parts comprising energy sources capable of causing injury.

0.2.4 Skilled person

Skilled person is a term applied to persons who have training or experience in the equipment technology, particularly in knowing the various energies and energy magnitudes employed in the equipment. A **skilled person** is expected to use their training and experience to recognize energy sources capable of causing pain or injury and to take action for protection from injury from those energies. **Skilled persons** should also be protected against unintentional contact or exposure to energy sources capable of causing injury.

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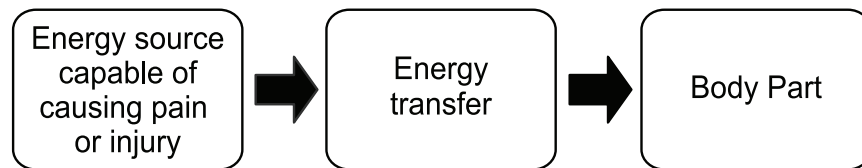
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0.3 Model for pain and injury

This subclause presents an engineering-based model for pain and injury and their relationship to an energy source.

An energy source that causes pain or injury does so through the transfer of some form of energy to or from a body part.

This concept is represented by a three-block model (see Figure 1).



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Figure 1 – Three block model for pain and injury

This safety standard specifies three classes of energy sources defined by magnitudes and durations of source parameters relative to either the body or to **combustible material** responses to those energy sources. Each energy class (see 4.2) is a function of the body part or the **combustible material** susceptibility to that energy magnitude (see Table 1).

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Table 1 – Response to energy class

Energy source	Effect on the body	Effect on combustible materials
Class 1	Not painful, but may be detectable	Ignition not likely
Class 2	Painful, but not an injury	Ignition possible, but limited growth and spread of fire
Class 3	Injury	Ignition likely, rapid growth and spread of fire

The energy threshold for pain or injury is not constant throughout the population. For example, for some energy sources, the threshold is a function of body mass; the lower the mass, the lower the threshold, and vice-versa. Other body variables include age, state of health, state of emotions, effect of drugs, skin characteristics, etc. Furthermore, even where outward appearances otherwise appear equal, individuals differ in their thresholds of susceptibility to the same energy source.

The effect of duration of energy transfer is a function of the specific energy form. For example, pain or injury from thermal energy can be very short (1 s) for high skin temperature, or very long (several hours) for low skin temperature.

Furthermore, the pain or injury may occur some considerable time after the transfer of energy to a body part. For example, pain or injury from some chemical reaction may not be manifested for days, weeks, months, or years.

0.4 Energy sources

This subclause identifies the energy sources addressed by this standard, and the pain or injury that results from a transfer of that energy to the body, and the likelihood of property damage that results from fire escaping the equipment.

An electrical product is connected to an electrical energy source (for example, the mains), an external power supply, or a battery. An electrical product uses the electrical energy to perform its intended functions.

In the process of using electrical energy, the product transforms the electrical energy into other forms of energy, for example thermal energy, kinetic energy, optical energy, audio energy, electromagnetic energy, etc. Some energy transformations may be a deliberate part of the product function (for example, moving parts of a printer, images on a visual display unit, sound from a speaker, etc). Some energy transformations may be a by-product of the product function (for example, heat dissipated by functional circuits, x-radiation from a cathode-ray tube, etc).

Some products may employ energy sources that are non-electrical energy sources such as batteries, moving parts, or chemicals, etc. The energy in these other sources may be transferred to or from a body part, or may be transformed into other energy forms (for example, a battery transforms chemical energy into electrical energy, or a moving body part transfers its kinetic energy to a sharp edge).

Examples of the types of energy forms and the associated injuries and property damage addressed in this standard are in Table 2.

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Table 2 – Examples of body response or property damage related to energy sources

Forms of energy	Examples of body response or property damage	Clause
Electrical energy (for example, energized conductive parts)	Pain, fibrillation, cardiac arrest, respiratory arrest, skin burn, or internal organ burn	5
Thermal energy (for example, electrical ignition and spread of fire)	Electrically-caused fire leading to burn-related pain or injury, or property damage	6
Chemical reaction (for example, electrolyte, poison)	Skin damage, lung and other organ damage, or poisoning	7
Kinetic energy (for example, moving parts of equipment, or a moving body part against an equipment part)	Laceration, puncture, abrasion, contusion, crush, amputation, or loss of a limb, eye, ear, etc.	8
Thermal energy (for example, hot accessible parts)	Skin burn	9
Radiated energy (for example, electromagnetic energy, optical energy, acoustic energy)	Loss of sight, skin burn, or loss of hearing	10

0.5 Safeguards

0.5.1 General

This subclause introduces the three-block model for safety to explain the function of a **safeguard** and describes various manifestations of **safeguards**.

Many products necessarily employ energy capable of causing pain or injury. Equipment design cannot eliminate such energy use. Consequently, such products should employ a scheme that reduces the likelihood of such energy being transferred to a body part. The scheme that reduces the likelihood of energy transfer to a body part is a **safeguard** (see Figure 2).

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Figure 2 – Three block model for safety

A **safeguard** is a device or scheme or system that

- is interposed between an energy source capable of causing pain or injury and a body part, and
- reduces the likelihood of transfer of energy capable of causing pain or injury to a body part.

NOTE **Safeguard** mechanisms against transfer of energy capable of causing pain or injury include

- attenuating the energy (reduces the value of the energy), or
- impeding the energy (slows the rate of energy transfer), or
- diverting the energy (changes the energy direction), or
- disconnecting, interrupting, or disabling the energy source, or
- enveloping the energy source (reduces the likelihood of the energy from escaping), or
- interposing a barrier between a body part and the energy source.

A **safeguard** can be applied to the equipment, to the local installation, to a person or can be a learned or directed behaviour (for example, resulting from an **instructional safeguard**) intended to reduce the likelihood of transfer of energy capable of causing pain or injury. A **safeguard** may be a single element or may be a set of elements.

Ideally, the order of preference for providing **safeguards** is:

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- **equipment safeguards**;
- **installation safeguards**;
- **instructional safeguards** invoking **personal protective equipment**, or avoidance behaviour.

In practice, **safeguard** selection will take account of the nature of the energy source, the intended user, the functional requirements of the equipment, and similar considerations.

0.5.2 Equipment safeguard

An **equipment safeguard** may be a **basic safeguard**, a **supplementary safeguard**, a **double safeguard**, or a **reinforced safeguard**.

0.5.3 Installation safeguard

Installation safeguards are not controlled by the equipment manufacturer, although in some cases, **installation safeguards** may be specified in the equipment installation instructions.

Generally, with respect to equipment, an **installation safeguard** is a **supplementary safeguard**.

NOTE For example, the protective earthing **supplementary safeguard** is located partly in the equipment and partly in the installation. The protective earthing **supplementary safeguard** is not effective until the equipment is connected to the installation.

Requirements for **installation safeguards** are not addressed in this standard. However, this standard does assume some **installation safeguards**, such as protective earthing, are in place and are effective.

0.5.4 Instructional safeguard

An **instructional safeguard** is a visual indicator (symbols or words or both) or an audible message describing the existence and location of an energy source capable of causing pain or injury and is intended to invoke a specific behaviour on the part of a person to reduce the likelihood of transfer of energy to a body part (see Annex F).

An **instructional safeguard** may be a **basic safeguard**, or a **supplementary safeguard**.

When accessing locations where the unit needs to be energized to perform a service activity, an **instructional safeguard** may be considered acceptable protection to bypass an **equipment safeguard** such that the person is made aware of how to avoid contact with a class 2 energy source.

If **equipment safeguards** would interfere with or prohibit the equipment function, an **instructional safeguard** may be a **reinforced safeguard**.

Provision of an **instructional safeguard** does not result in an **ordinary person** becoming an **instructed person** (see 0.5.8).

0.5.5 Personal safeguard

A **personal safeguard** may be a **basic safeguard**, a **supplementary safeguard**, or a **reinforced safeguard**.

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Requirements for **personal safeguards (personal protective equipment)** are not addressed in this standard. However, this standard does assume that **personal safeguards** are available for use as specified by the manufacturer.

0.5.6 Safeguards during ordinary or instructed person service conditions

During **ordinary person** or **instructed person** service conditions, **safeguards** for such persons may be necessary. Such **safeguards** can be **equipment safeguards**, **personal safeguards**, or **instructional safeguards**. Application of these **safeguards** is specified in the respective clauses.

0.5.7 Equipment safeguards during skilled person service conditions

During **skilled person** service conditions, **equipment safeguards** should be provided to protect against the effects of a body's involuntary reaction (for example, startle) that might cause unintentional contact with a class 3 energy source located outside the view of the **skilled person**.

NOTE This **safeguard** typically applies in large equipment, where the **skilled person** may need to partially or wholly enter between two or more class 3 energy source locations while servicing.

0.5.8 Precautionary safeguard

A **precautionary safeguard** is the training and experience or supervision of an **instructed person** by a **skilled person** to use precautions to protect the **instructed person** against class 2 energy sources. **Precautionary safeguards** are not specifically prescribed in this standard but are assumed to be effective when the term **instructed person** is used.

During equipment servicing, an **instructed person** may need to remove or defeat an **equipment safeguard**. In this case, an **instructed person** must then apply precaution as a **safeguard** to avoid injury.

0.5.9 Skill safeguard

A **skill safeguard** is the education, training, knowledge and experience of the **skilled person** that is employed to protect the **skilled person** against class 2 and class 3 energy sources. **Skill safeguards** are not specifically prescribed in this standard but are assumed to be effective when the term **skilled person** is used.

During equipment servicing, a **skilled person** may need to remove or defeat an **equipment safeguard**. In this case, a **skilled person** must then apply skill as a **safeguard** to avoid injury.

0.5.10 Examples of safeguard characteristics

Table 3 lists some examples of **safeguard** characteristics.

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Table 3 – Examples of safeguard characteristics

Safeguard	Basic safeguard	Supplementary safeguard	Reinforced safeguard
Equipment safeguard: a physical part of an equipment	Effective under normal operating conditions	Effective in the event of failure of the basic safeguard	Effective under normal operating conditions and in the event of a single fault condition elsewhere in the equipment
	Example: basic insulation	Example: supplementary insulation	Example: reinforced insulation
	Example: normal temperatures below ignition temperatures	Example: fire enclosure	Not applicable
Installation safeguard: a physical part of a man-made installation	Effective under normal operating conditions	Effective in the event of failure of an equipment basic safeguard	Effective under normal operating conditions and in the event of a single fault condition elsewhere in the equipment
	Example: wire size	Example: overcurrent protective device	Example: socket outlet
Personal safeguard: a physical device worn on the body	In the absence of any equipment safeguard , effective under normal operating conditions	Effective in the event of failure of an equipment basic safeguard	In the absence of any equipment safeguard , effective under normal operating conditions and in the event of a single fault condition elsewhere in the equipment
	Example: glove	Example: insulating floor mat	Example: electrically insulated glove for handling live conductors
Instructional safeguard: a voluntary or instructed behaviour intended to reduce the likelihood of transfer of energy to a body part	In the absence of any equipment safeguard , effective under normal operating conditions	Effective in the event of failure of an equipment basic safeguard	Only effective on an exceptional basis, when providing all appropriate safeguards would prevent the intended functioning of the equipment
	Example: instructional safeguard to disconnect telecommunication cable before opening the cover	Example: after opening a door, an instructional safeguard against hot parts	Example: instructional safeguard of hot parts in an office photocopier, or a continuous roll paper cutter on a commercial printer

0.6 Electrically-caused pain or injury (electric shock)

0.6.1 General

This subclause describes models for electrically-caused pain or injury and models for reducing the likelihood of transfer of electrical energy capable of causing pain or injury to a body part.

0.6.2 Models for electrically-caused pain or injury

Electrically-caused pain or injury may occur when electrical energy capable of causing pain or injury is transferred to a body part (see Figure 3).

Electrical energy transfer occurs when there are two or more electrical contacts to the body:

- the first electrical contact is between a body part and a conductive part of the equipment;

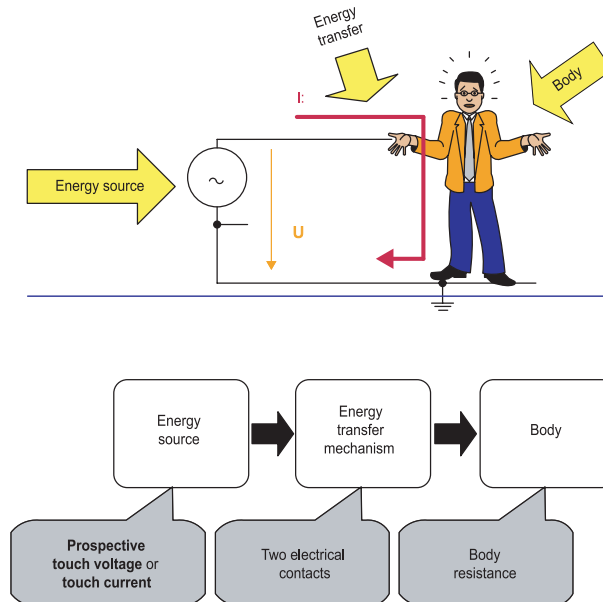
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– the second electrical contact is between another body part, and

- earth, or
- another conductive part of the equipment.



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Figure 3 – Schematic and model for electrically-caused pain or injury

Depending on the magnitude, duration, wave shape, and frequency of the current, the effect to the human body varies from undetectable to detectable to painful to injurious.

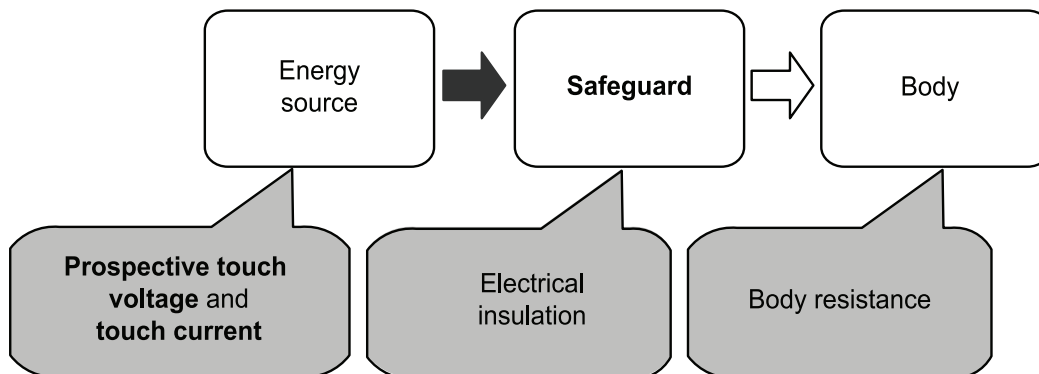
0.6.3 Models for protection against electrically-caused pain or injury

Protection against electrically-caused pain or injury requires that one or more **safeguards** be interposed between an electrical energy source capable of causing pain or injury and a body part (see Figure 4).

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Figure 4 – Model for protection against electrically-caused pain or injury

Protection against electrically-caused pain is provided under **normal operating conditions** and **abnormal operating conditions**. Such protection requires that, under **normal operating conditions** and **abnormal operating conditions**, a **basic safeguard** be interposed between an electrical energy source capable of causing pain and an **ordinary person**.

The most common **basic safeguard** against an electrical energy source capable of causing pain is electrical insulation (also known as **basic insulation**) interposed between the energy source and a body part.

Protection against electrically-caused injury is provided under **normal operating conditions**, **abnormal operating conditions**, and **single fault conditions**. Such protection requires that, under **normal operating conditions** and **abnormal operating conditions**, both a **basic safeguard** and a **supplementary safeguard** be interposed between an electrical energy source capable of causing injury and an **ordinary person** (see 4.3.2.4), or an **instructed person** (see 4.3.3.3). In the event of a failure of either **safeguard**, the other **safeguard** becomes effective.

The **supplementary safeguard** against an electrical energy source capable of causing injury is interposed between the **basic safeguard** and a body part. A **supplementary safeguard** may be additional electrical insulation (**supplementary insulation**) or a protectively earthed conductive barrier or other construction that performs the same function.

The most common **safeguard** against an electrical energy source capable of causing injury is electrical insulation (also known as **double insulation** or **reinforced insulation**) interposed between the energy source and a body part.

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Likewise, a **reinforced safeguard** may be interposed between an electrical energy source capable of causing injury and a body part.

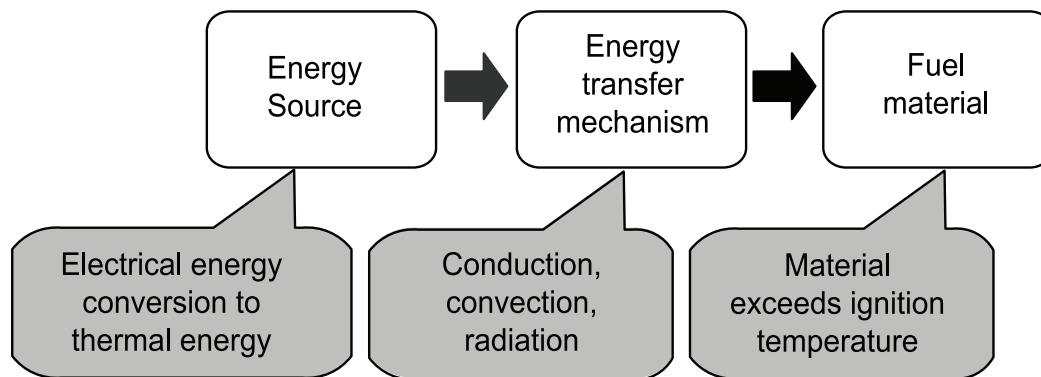
0.7 Electrically-caused fire

0.7.1 General

This subclause describes models to reduce the likelihood of ignition (within the equipment) or to reduce the likelihood of fire (originating within the equipment) from spreading beyond the equipment.

0.7.2 Models for electrically-caused fire

Electrically-caused fire is due to conversion of electrical energy to thermal energy (see Figure 5), where the thermal energy heats a fuel material followed by ignition and combustion.



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Figure 5 – Model for electrically-caused fire

Electrical energy is converted to thermal energy either in a resistance or in an arc and is transferred to a fuel material by conduction, convection, or radiation. As the fuel material heats, it chemically decomposes into gases, liquids and solids. When the gas is at its ignition temperature, the gas can be ignited by an ignition source. When the gas is at its spontaneous ignition temperature, the gas will ignite by itself. Both result in fire.

0.7.3 Models for protection against electrically-caused fire

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The **basic safeguard** against electrically-caused fire (see Figure 6) is that the temperature of a material, under **normal operating conditions** and **abnormal operating conditions**, does not cause the material to ignite.

The **supplementary safeguard** against electrically-caused fire reduces the likelihood of ignition or, in the case of ignition, reduces the likelihood of spread of fire.

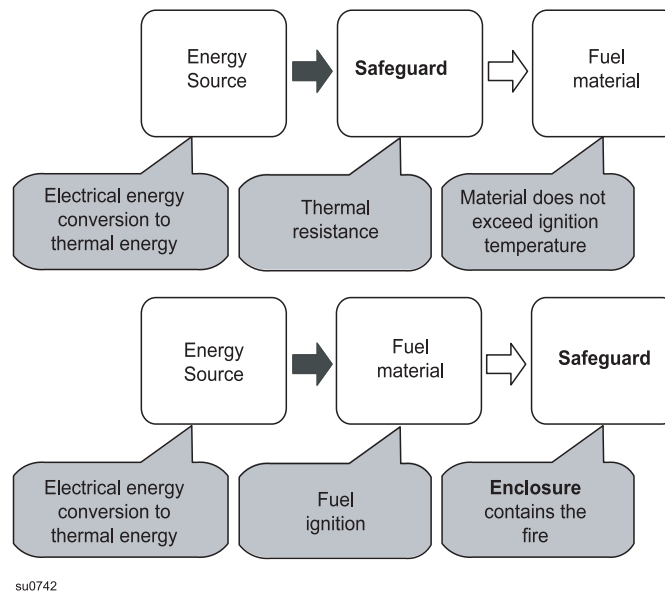


Figure 6 – Models for protection against fire

0.8 Chemically-caused injury

This subclause describes models for reducing the likelihood of injury from exposure to chemicals.

Chemically-caused injury is due to a chemical reaction with a body part. The extent of injury by a given agent depends on both the magnitude and duration of exposure and on the body part susceptibility to that agent.

The **basic safeguard** against chemically-caused injury is containment of the material.

Supplementary safeguards against chemically-caused injury may include:

- a second container or a spill-resistant container;
- containment trays;
- tamper-proof screws to prevent unauthorized access;

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– **instructional safeguards.**

National and regional regulations govern the use of and exposure to chemicals used in equipment. These regulations do not enable a practical classification of chemicals in the manner in which other energy sources are classified in this standard. Therefore, energy source classifications are not applied in Clause 7.

0.9 Mechanically-caused injury

This subclause describes models for reducing the likelihood of injuries such as cuts, bruises, broken bones, etc. due to transfer of kinetic energy to a body part.

Mechanically-caused injury is due to kinetic energy transfer to a body part when a collision occurs between a body part and an equipment part. The kinetic energy is a function of the relative motion between a body part and **accessible** parts of the equipment, including parts ejected from the equipment that collide with a body part.

Examples of kinetic energy sources are:

- body motion relative to sharp edges and corners;
- part motion due to rotating or other moving parts, including pinch points;
- part motion due to loosening, exploding, or imploding parts;
- equipment motion due to instability;
- equipment motion due to wall, ceiling, or rack mounting means failure;
- equipment motion due to handle failure;
- part motion due to an exploding battery;
- equipment motion due to cart or stand instability or failure.

The **basic safeguard** against mechanically-caused injury is a function of the specific energy source. **Basic safeguards** may include:

- rounded edges and corners;
- an **enclosure** to prevent a moving part from being **accessible**;
- an **enclosure** to prevent expelling a moving part;
- a **safety interlock** to control access to an otherwise moving part;
- means to stop the motion of a moving part;
- means to stabilize the equipment;
- handles;
- mounting means;

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- means to contain parts expelled during **explosion** or implosion.

The **supplementary safeguard** against mechanically-caused injury is a function of the specific energy source. **Supplementary safeguards** may include:

- **instructional safeguards**;
- instructions and training;
- additional **enclosures** or barriers;
- **safety interlocks**.

The **reinforced safeguard** against mechanically-caused injury is a function of the specific energy source. **Reinforced safeguards** may include:

- extra thick glass on the front of a CRT;
- rack slide-rails and means of support;
- **safety interlock**.

0.10 Thermally-caused injury (skin burn)

0.10.1 General

This subclause describes models for thermally-caused injury and models for reducing the likelihood of thermal energy capable of causing pain or injury being transferred to a body part.

0.10.2 Models for thermally-caused injury

Thermally-caused injury may occur when thermal energy capable of causing injury is transferred to a body part (see Figure 7).

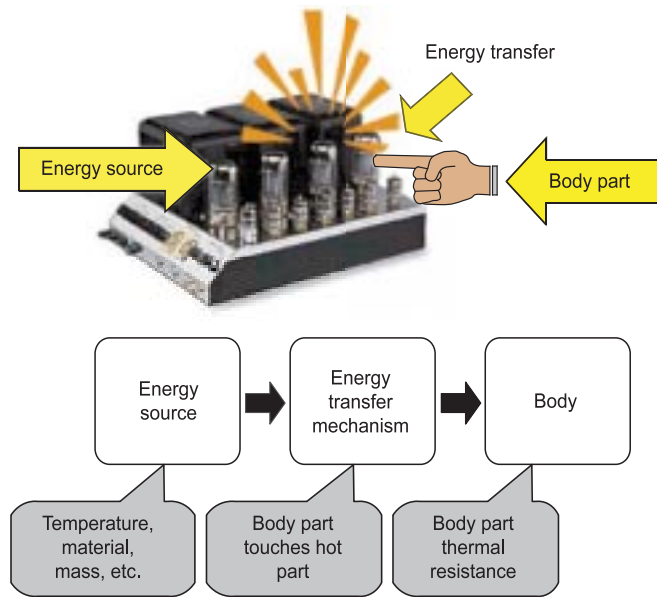
Thermal energy transfer occurs when a body touches a hot equipment part. The extent of injury depends on the temperature difference, the thermal mass of the object, rate of thermal energy transfer to the skin, and duration of contact.

The requirements in this standard only address **safeguards** against thermal energy transfer by conduction. This standard does not address **safeguards** against thermal energy transfer by convection or radiation.

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Figure 7 – Schematic and model for thermally-caused injury

Depending on the temperature, contact duration, material properties, and mass of the material, the perception of the human body varies from warmth to heat that may result in pain or injury (burn).

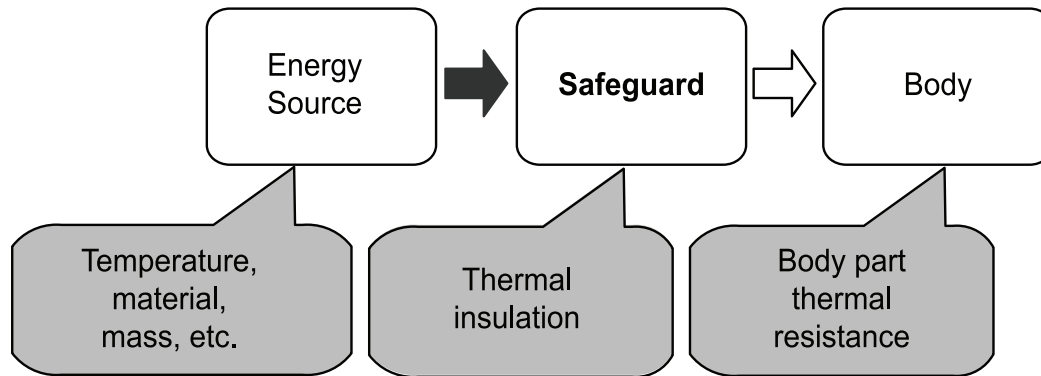
0.10.3 Models for protection against thermally-caused pain or injury

Protection against thermally-caused pain or injury requires that one or more **safeguards** be interposed between a thermal energy source capable of causing pain or injury and an **ordinary person** (see Figure 8).

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Figure 8 – Model for protection against thermally-caused injury

Protection against thermally-caused pain is required under **normal operating conditions** and **abnormal operating conditions**. Such protection requires that a **basic safeguard** be interposed between a thermal energy source capable of causing pain and an **ordinary person**.

Protection against thermally-caused injury is required under **normal operating conditions**, **abnormal operating conditions** and **single fault conditions**. Such protection requires that a **basic safeguard** and a **supplementary safeguard** be interposed between a thermal energy source capable of causing injury and an **ordinary person**.

The **basic safeguard** against a thermal energy source capable of causing pain or injury is thermal insulation interposed between the energy source and a body part. In some cases, a **basic safeguard** against a thermal energy source capable of causing pain or injury may be an **instructional safeguard** identifying the hot parts and how to reduce the likelihood of injury. In some cases, a **basic safeguard** reduces the likelihood of a non-injurious thermal energy source from becoming a thermal energy source capable of causing pain or injury.

Examples of such **basic safeguards** are:

- control of electrical energy being converted to thermal energy (for example, a **thermostat**);
- heat sinking, etc.

The **supplementary safeguard** against a thermal energy source capable of causing injury is thermal insulation interposed between the energy source and a body part. In some cases, a **supplementary safeguard** against a thermal energy source capable of causing pain or injury may be an **instructional safeguard** identifying the hot parts and how to reduce the likelihood of injury.

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0.11 Radiation-caused injury

This subclause describes models for reducing the likelihood of injury from exposure to radiated energy.

Radiation-caused injury within the scope of this standard is generally attributed to one of the following energy transfer mechanisms:

- heating of a body organ caused by exposure to non-ionising radiation, such as the highly localised energy of a laser impinging on the retina, or heating a larger volume such as the energy from a high frequency wireless, electromagnetic fields, or high frequency transmitter, or
- auditory injury caused by over stimulation of the ear by excessive peaks or sustained loud sound, leading to physical or nerve damage.

Radiated energy is transferred by impingement of wave emission upon a body part.

The **basic safeguard** against radiation-caused injury is containment of the energy within an **enclosure** that is opaque to the radiated energy.

The **basic safeguard** against auditory injury is the provision of warnings and information advising the user how to use the equipment correctly.

Examples of **basic safeguards** against auditory pain and injury are the provision of warnings and information advising the user how to use the equipment correctly. Examples of **supplementary safeguards** against auditory injury are the provision of a **safety interlock** or a soundproof **enclosure**.

There are several **supplementary safeguards** against radiation-caused injury. The **supplementary safeguards** may include **safety interlocks** to disconnect power to the generator, tamper-proof screws to prevent unauthorized access, etc.

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AUDIO/VIDEO, INFORMATION AND COMMUNICATION TECHNOLOGY EQUIPMENT – Part 1: Safety requirements

1 Scope

This part of IEC 62368 is applicable to the safety of electrical and electronic equipment within the field of audio, video, information and communication technology, and business and office machines with a **rated voltage** not exceeding 600 V. This standard does not include requirements for performance or functional characteristics of equipment.

NOTE 1 Examples of equipment within the scope of this standard are given in Annex A.

This part of IEC 62368 is also applicable to components and subassemblies intended for incorporation in this equipment. Such components and subassemblies need not comply with every requirement of the standard, provided that the complete equipment, incorporating such components and subassemblies, does comply.

This standard specifies **safeguards** for **ordinary persons**, **instructed persons**, and **skilled persons**.

NOTE 2 In Australia, the work conducted by an **instructed person** or a **skilled person** may require formal licensing from regulatory authorities.

This standard assumes an altitude of 2 000 m unless specified otherwise by the manufacturer.

This standard does not apply to equipment to be used in wet areas. Additional requirements may apply.

This standard does not apply to equipment for outdoor installation.

NOTE 3 Information and communication technology equipment that is intended for use outdoors is covered by IEC 60950-22.

This standard does not include requirements for functional safety.

NOTE 4 For specific functional and software safety requirements of electronic safety-related systems (for example, protective electronic circuits), see IEC 61508-1.

This standard does not address:

- manufacturing processes except safety testing;
- injurious effects of gases released by thermal decomposition or combustion;
- disposal processes;
- effects of transport (other than as specified in this standard);
- effects of storage of materials, components, or the equipment itself;
- the likelihood of injury from particulate radiation such as alpha particles and beta particles;
- the likelihood of thermal injury due to radiated or convected thermal energy;
- the likelihood of injury due to flammable liquids;

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- the use of the equipment in oxygen-enriched or **explosive** atmospheres;
- exposure to chemicals other than those specified in Clause 7;
- electrostatic discharge events.

1DV.1 DR Modify Clause 1 by adding the following text:

1DV.1.1 This standard also is applicable to equipment designed to be installed in accordance with the Canadian Electrical Code, Part I, C22.1-09; Canadian Electrical Code, Part II, General Requirements, CAN/CSA C22.2 No. 0-10; the National Electrical Code, NFPA 70-2011; and the National Electrical Safety Code, IEEE C2-2007.

1DV.1.2 The standard is also applicable to equipment, when identified by a marking or instruction [see Annex DVK (Annex DVA, Clause 1)], designed to be installed in accordance with Article 645 of the National Electrical Code, NFPA 70-2011, and the Standard for the Protection of Information Technology Equipment, NFPA 75-2009.

1DV.1.3 See Annex DVA for requirements and references to regulatory requirements that apply to this equipment, as applicable.

1DV.2 D2 Modify Clause 1 by adding the following text:

1DV.2.1 This standard includes additional requirements for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities. See Annex DVB.

1DV.2.2 This standard includes additional requirements for equipment intended for mounting under kitchen cabinets. See Annex DVC.

1DV.2.3 This standard does not apply to equipment having Remote Feeding Telecommunication (RFT) circuits. Equipment having RFT circuits is covered by CSA/UL 60950-21.

1DV.2.4 Additional requirements may apply to large data storage equipment. Refer to CSA/UL 60950-23.

1DV.3 DE Modify Clause 1 by replacing the sixth paragraph and Note 3 with the following:

1DV.3.1 For equipment intended for outdoor installation, additional requirements may apply.

NOTE 3 Information and communication technology equipment that is intended for use outdoors is covered by CSA/UL 60950-22. Audio/video equipment that is intended for use outdoors is covered by the relevant requirements in CSA C22.2 No. 60065 or UL 60065.

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