CERTIFICATION IMPACT ANALYSIS:
IEC 62368-1:2023 (EDITION 4)
Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements

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This analysis is intended to identify and analyze the impact of notable differences between the latest IEC 62368-1:2023 (Ed. 4) standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements and its predecessor, IEC 62368-1:2018 (Ed. 3). This analysis will permit people already familiar with Ed. 3 to become familiar with the likely certification impact of Ed. 4. Other select observations are included that may be of interest to the reader. This analysis will be updated periodically as additional information on the application of the new standard becomes known.

This analysis provides a more comprehensive review of the changes than provided in the foreword of Ed. 4. For reference purposes, the foreword to Ed. 4 includes the following information:

“This edition includes the following significant technical changes with respect to the previous edition:

a) new table with requirements for external circuits;
b) revision of requirements for openings in fire enclosures;
c) revision of requirements for liquid-filled components;
d) revision of battery charging requirements.”

In Europe, when CENELEC publishes their EN IEC 62368-1 standard based on Ed. 4 of IEC 62368-1, this analysis will be updated to include indication of the significant or otherwise noteworthy European Common Modifications and Special National Conditions in the latest EN IEC 62368-1.

Similarly, also to be included in future revisions to this analysis will be changes to the National Differences (NDs) associated with the latest binational standard, CSA CC2.2 No. 62368-1/UL 62368-1, Ed. 4, when it is published.

Background

IEC 62368-1 is the international standard for safety of AV and ICT equipment, including AV and ICT components, subassemblies and peripherals. It encompasses under its scope audio equipment, video equipment, information technology equipment, communication technology equipment, office appliances and multimedia equipment and components — including power supplies — for use in homes, offices, businesses, schools, computer rooms and similar locations. The first edition of IEC 62368-1 was published in 2010, the second edition was published in 2014, and the third edition was published in 2018.

In Europe, the next standard will be designated EN IEC 62368-1:xxxx/A11:xxxx (also based on IEC 62368-1:2023), which will include European common modifications, special national conditions and A-deviations that are developed and maintained by CENELEC.

The date of withdrawal (DOW) of superseded standards associated with EN IEC 62368-1:xxxx/A11:xxx will be determined later.

In the U.S. and Canada, the binational standard (BNS) for 62368-1, formally designated CSA C22.2 No. 62368-1/UL 62368-1, includes U.S./Canadian NDs to address needed national requirements that are not in the base IEC document. The technical content of the BNS is developed and maintained by the CAN/U.S. Technical Harmonization Committee (THC), which consists of representation from UL Solutions, CSA and a variety of U.S. and Canadian AV, IT and communication technology equipment manufacturers. The latest CAN/U.S. BNS, CSA CC2.2 No. 62368-1/UL 62368-1, Ed. 3, was published on Dec. 13, 2019.

The effective date for UL 62368-1, Ed. 4, will be designated at publication of the standard, and likely will be aligned with the CENELEC DOW of superseded standards associated with EN IEC 62368-1:20xx. As in the past, this alignment of the U.S./UL effective date with the EU/CENELEC DOW is beneficial to AV/ICT manufacturers globally since such alignment allows coordination of market access to two major regions of the world based on the same transition date.

AV/ICT sector review process:
https://www.UL.com/resources/avict-sector-review-process

UL 62368-1 effective date information:
https://www.UL.com/resources/ul-62368-1-effective-date-information

Notes to this analysis:

- Unless otherwise noted, all subclause/annex references are to IEC 62368-1:2023 (Ed. 4).
- Discussion of changes and differences associated with IEC 62368-1:2023 (Ed. 4) are in plain text.
- Discussion of new or revised special national conditions (differences) associated with EN IEC 62368-1:xxx/A11:xxx will be designated **CENELEC ND**.
- Discussion of new or revised NDs associated with revisions of the planned BNS CSA C22.2 No. 62368-1/UL 62368-1, Ed. 4, will be designated **CAN/U.S. ND**.

Explanation of impact statements:

Statement	Impact
None	Anticipate no impact on the present certification practice to IEC 62368-1 for most AV/ICT equipment due to the change.
Minor*	Anticipate limited impact on the present certification practice to IEC 62368-1 for some or all AV/ICT equipment due to the change.
Significant*	Anticipate sizable impact on the present certification practice to IEC 62368-1 for some or all AV/ICT equipment due to the change.

*For new/revised requirements that are considered **more onerous** than superseded requirements, the impact statement (minor, significant) will be followed by a (+). For new/revised requirements that are considered **less onerous** than the superseded requirements, the impact statement (minor, significant) will be followed by a (-). No symbol next to a minor or significant statement indicates that, although there could be impact associated with the change, it is indeterminate whether the impact will be more or less than current. Note: These analysis conclusions may evolve (change) over time as more information is learned on the application of the latest version of the standard.

Revision history:

New or significantly revised sections within the current analysis tables are indicated by *.

General		
Subclause	**Discussion**	**Impact**
NA	A very large number of revisions have been incorporated into Ed. 4 that are intended to be editorial and adjust the correct usage of the words “may” and “can” in a standardization context.	None. Although editorial, sometimes such changes, especially in the volume contained in Ed. 4, can have unintended consequences on application.

Clause 0 (Principles of this product safety standard)		
Subclause	**Discussion**	**Impact**
0.5.5.1 Behavioral safeguards – Introduction	To clarify the HBSE approach, a statement was added that while it is necessary to rely upon a **precautionary safeguard** and a **skilled safeguard** in certain situations, an **equipment safeguard** provides protection for all persons and is preferred above a **behavioural safeguard**.	None. Informative background statement
0.10.1 Models for thermally caused injury	In IEC 62368-1:2018, a statement was included that the likelihood of thermal injury due to radiated or convected thermal energy was not covered. However, as radiated or convected thermal injury can manifest itself in surface temperatures and other aspects covered by this standard, this statement has been removed.	None. Informative background statement

Clause 1 (Scope)		
Subclause	**Discussion**	**Impact**
1 **Scope**	A statement has been added to the scope that explanatory information related to this document is contained in IEC TR 62368-2, Audio/Video, Information and Communication Technology Equipment – Part 2: Explanatory Information Related to IEC 62368-1:2018, and it provides rationale and explanatory information that may be helpful in applying this document. This statement was added to emphasize the importance of IEC TR 62368-2 as a companion document to the IEC 62368-1 document.	None. Informative
	A statement has been added to the scope that this document harmonizes with IEC 61140, Protection Against Electric Shock – Common Aspects for Installation and Equipment, and considers the electrical installation by properly interfacing with the common safety aspects of the installation. This statement was added to clarify the position of IEC TC108 that this document is compatible with other horizontal IEC installation requirements.	None. Informative
	In the list of applications that the standard does not apply to, equipment to be used in wet areas of indoor locations has been added. Although IEC TC108 acknowledges that AV/ICT is sometimes used in such areas, and such equipment should be subjected to the appropriate requirements, the development of specific requirements for this standard is future work.	None. Informative
	In IEC 62368-1:2018, a statement was included that the likelihood of thermal injury due to radiated or convected thermal energy was not covered. However, as radiated or convected thermal injury can manifest itself in surface temperatures and other aspects covered by this standard, this statement has been removed.	None. Clarification of scope only

Clause 2 (Normative references)		
Subclause	**Discussion**	**Impact**
2 **Normative references**	Standards listed in Clause 2 are normatively referenced in the body and annexes of IEC 62368-1 (compared to standards that are referenced informatively, e.g., in a Note, which are listed in the bibliography (end of the standard). Since a few new or updated standards are referenced in the body or annexes, there also are several new standards in Clause 2.	NA. Impact is determined by specific reference in the body and annexes of IEC 62368-1.

Clause 3 (Terms, definitions and abbreviated terms)		
Subclause	**Discussion**	**Impact**
3.3.1.1 **Audio amplifier**	To coordinate with extensive changes to Annex E, a new term/definition for **audio amplifiers** has been added, like what was in IEC 60065.	None. Definition
3.3.1.3 **Mains**	Past wording that associated PS3 with **mains** has been removed since it was establishing a normative condition/requirement associated with the term and definition of **mains**. If such an association is needed, it should be stated in the body of the standard, Clauses 1-10. Also, a new note has been added to clarify that applications of powering of **external circuits** by using communication cables and circuits that are isolated from the mains are not classified as mains.	None. Definition
3.3.1.4 **Pink noise**	To coordinate with extensive changes to Annex E, a new term/definition for **pink noise** has been added, similar to what was in IEC 60065.	None. Definition
3.3.3.2 **Fixed equipment**	The definition for **fixed equipment** has been clarified to state that it includes “equipment fastened to a support, or otherwise secured in a specific location by a means defined by the manufacturer in the installation instructions.” This modification was considered necessary because there are a variety of applications for	None. Definition; considered to be consistent with application by most users of the standard

Clause 3 (Terms, definitions and abbreviated terms)		
Subclause	**Discussion**	**Impact**
	which equipment is fixed to the structure and it's not always associated with floor-mounting.	
Liquid cooling terms	With the introduction of requirements for **modular liquid-filled components** and a variety of other refinements of the standard's cooling requirements in Ed. 4, it was determined that a series of defined associated terms and definitions needed to be added into Clause 3.	NA
3.3.6.4 Coolant	**Coolant** has been defined as a liquid or gas medium by means of which heat is transferred.	None. Definition
3.3.6.5 Device	Due to the need to define parts of systems and subsystems, the term **device** has been defined as a material element or assembly or such elements intended to perform a required function. A note further clarifies that a **device** may form part of a larger system (for example, a server node installed in a rack system).	None. Definition
3.3.6.8 Liquid cooling system	A **liquid cooling system** has been defined as a system that circulates and cools liquid used for decreasing the temperature of a **device.**	None. Definition
3.3.6.9 Liquid-filled component (LFC)	**A liquid-filled component (LFC)** has been defined as constituent part of a **device** which cannot be physically divided into smaller parts without losing its particular function and through which the **coolant** passes. Examples given include cold plate, tubing, fittings and interconnects.	None. Definition
3.3.6.10 Liquid-filled component assembly (LFC assembly)	**A liquid filled component assembly (LFC assembly)** has been defined as a set of components, at least one of which is a **liquid-filled component**, assembled into a single unit. Examples given include assembly of cold plate, tubing, fittings and interconnects.	None. Definition
3.3.6.11 Loudspeaker driver	To coordinate with extensive changes to Annex E, a new term/definition for **loudspeaker drivers** has been added, similar to what was in IEC 60065.	None. Definition

Clause 3 (Terms, definitions and abbreviated terms)		
Subclause	**Discussion**	**Impact**
3.3.6.12 Modular liquid-filled component (modular LFC)	A **modular liquid-filled component (modular LFC)** has been defined as a **device** that contains a **liquid-filled component assembly** that relies on external connections to complete the **liquid cooling system**. Examples given include cooling distribution units or facility water systems for operation.	None. Definition
3.3.6.19 Self-contained LFC	A **self-contained** LFC has been defined as a **device** that contains a complete **liquid cooling system**. A note further clarifies that a **self-contained LFC** comprising of multiple **modular LFCs** is considered a **modular LFC** with regards to G.15.	None. Definition
3.3.6.21 Subassembly	The term **subassembly** is used close to 20 times in IEC 62368-1 without having had a definition being established. Therefore, a new term and definition for **subassembly** was added, mainly that a **subassembly** is a unit assembled separately and designed to be incorporated with other units into a larger manufactured product and that cannot work independently from the final product, with a note further clarifying that a **subassembly** is regarded as a component in the final product.	None. Definition
3.3.17.4 Highest specified charging temperature	Clarification on the details in the terms for highest and lowest **specified charging temperature** — mainly, the associated temperature is the surface temperature of the cells within the battery.	None. Definition
3.3.17.5 Lowest specified charging temperature	Clarification on the details in the terms for highest and lowest **specified charging temperature** — mainly, the associated temperature is the surface temperature of the cells within the battery.	None. Definition

Clause 3 (Terms, definitions and abbreviated terms)		
Subclause	**Discussion**	**Impact**
3.3.17.8 Secondary lithium battery	In addition to simplifying the definition of a **secondary lithium battery**, the note to this definition has been modified, removing manganese to correct that lithium manganese metal or alloy is not covered by the definition of **secondary lithium battery**.	None. Definition

Clause 4 (General requirements)		
Subclause	**Discussion**	**Impact**
4.1.1 Application of requirements and acceptance of materials, components and subassemblies	The previous provision for acceptance of components evaluated to the legacy standards — Internal and external components and subassemblies that comply with IEC 60950-1 or IEC 60065 are acceptable as part of equipment covered by this document without further evaluation other than to consider the appropriate use of the component or subassembly in the end product. — has been removed since IEC 62368-1 now will be in its fourth edition.	Significant (+). Although this provision for use of 60065- and 60950-compliant components has been heavily used for three editions, it was never intended to be a permanent allowance. Additionally, most manufacturers of AV or ICT components have transitioned their components to IEC 62368-1-based certifications if they intended them to remain on the market after Dec. 20, 2020, which was the key transition date to IEC 62368-1 in the EU and CAN/U.S. However, this change is being classified as a potentially significant change since some manufacturers will be impacted.

Clause 4 (General requirements)		
Subclause	**Discussion**	**Impact**
	A new statement has been added to clarify how the term “classification” is used in the context of this document, specifically to clearly identify the energy source, the number of required **safeguards** and the requirements for each **safeguard**.	None. Clarification, and reflects present practice
4.1.2 Use of components	For components used in circuits not in accordance with their specified ratings, the requirement statement has been clarified that the components shall be subjected to the applicable tests of the component standard under the conditions occurring in the equipment.	None. Clarification, and reflects present practice
4.1.3 Equipment design and construction	Although 4.1.3 already mentions the need to consider B.2 (**normal operating conditions**), B.3 (**abnormal operating conditions**), and B.4 (**single-fault conditions**), there was no mention of need to consider B.1 (**general test conditions**), so a reference to B.1 was added.	Minor (+). Generally reflects common practice
	New material has been added clarifying how accessibility by using a **tool** should be considered when an **ordinary person** or an **instructed person** has to access areas containing Class 2 and Class 3 energy sources.	Minor (+). Generally reflects common practice
4.1.8 Liquids, refrigerants and liquid-filled components (LFCs)	The title of 4.1.8 has been changed to reflect its expanded scope, now also covering **modular LFCs** and refrigerants. Also, the > 1 liter exemption has been removed since Annex G.15 now covers > 1-liter systems in its **modular LFC** requirements.	Significant (+). Since this edition is the first time that IEC 62368-1 has formally addressed liquid handling systems > 1 liter, there could be some impact on some manufacturers making such systems, although most equipment certified to IEC 62368-1 has been subjected to some level of requirements — either those in G.15 or some other requirements driven by 4.1.5, Constructions and

Clause 4 (General requirements)		
Subclause	**Discussion**	**Impact**
		components not specifically covered.
	A new statement has been added directing manufacturers of equipment using refrigerants to see IEC 60335-2-40 and/or IEC 61010-2-011. This consideration would include flammable refrigerants. Additional informative material is being added to IEC TR 62368-2.	Minor. Reflects present practice due to 4.1.5
4.1.9 Electrical measuring instruments	Added to the existing requirement that measurements are to be made with a meter having an input impedance that has negligible influence on the measurement, an additional stipulation has been added that the input impedance of a measuring instrument to measure voltage is to have a minimum impedance of 1 MΩ. This stipulation was added to promote consistency of measurements.	Minor. Generally reflects present practice
4.1.10 Temperature measurements	In addition to some minor editorial changes, a new statement has been added that temperature measurements are made in accordance with B.1.5.	Minor. Reflects present practice
4.4.3.1 Safeguard robustness – General	To address the concern that nonaccessible thermoplastic safeguards also need a minimum level of robustness, a new statement has been added that a solid **safeguard** made of thermoplastic material that is not **accessible** shall comply with the stress relief test of 4.4.3.8. It is noted that this consideration would only be applied if the standard does not define specific performance criteria for the thermoplastic safeguard. For example, an insulation sheet (safeguard) between the bottom of a switch mode power supply (SMPS) and a metal enclosure would be tested per 4.4.3.8, but a transformer bobbin would not be tested, as 5.4.10 already contains requirements for bobbins serving as a safeguard.	Minor (+). Although a new requirement, the principle has been applied by some certifiers, and most constructions are expected to be able to comply.

Clause 4 (General requirements)		
Subclause	**Discussion**	**Impact**
4.6 Fixing of conductors and conductive parts	To provide clarification, a series of relatively minor, mostly editorial modifications have been made throughout 4.6 to promote consistent application.	Minor. Generally reflects present practice
4.8.1 Equipment containing coin/button cell batteries – General	To address some misunderstanding of the intent of 4.8 and its application to products like personal computers and servers, it has been further clarified in 4.8.1 that equipment is exempt from 4.8 "…for which it is unlikely that the **coin/button cell battery** will be removed by children due to location of the **battery** within the equipment." However, in such cases, the instructional safeguard requirements in 4.8.2 still apply. Although some subjectivity will remain, this change was thought necessary because, although most PCs and servers have coin/button batteries inside the equipment and the equipment is accessible to children, it is not IEC TC108's intent to imply that the PCs/servers are a hazard simply because they have coin/button cells inside them. Subclause 4.8 and its requirements are primarily targeting remote controls and other AV/ICT devices for which children may have direct access to the battery compartment holding the coin/button cell battery.	Minor. Should promote the intended application of 4.8 to PCs, servers and similar equipment that may have embedded **coin/button cell batteries**
4.8.3 Equipment containing coin/button cell batteries – Construction	To provide some clarification on how to treat common constructions, the subclause has been broken up into two parts, depending on (a) if a **tool**, such as a screwdriver or coin, is required to open or remove the **coin/button cell battery** compartment, or (b) if a **tool** is not required to open or remove the **coin/button cell battery** compartment. Also, to further promote consistency, conforming examples are being added to IEC TR 62368-2.	Minor. The substance of the requirements has not changed, but the modifications should promote more consistency in application.

Clause 4 (General requirements)		
Subclause	**Discussion**	**Impact**
4.9 Likelihood of fire or shock due to entry of conductive objects	Since addressing the likelihood of fire or shock due to entry of conductive objects is hazard-based, the ES and PS requirements have been separated into two distinct line items, each having its own requirement based on Clause 5 and Clause 6, respectively. In summary, top and side openings are required to comply with Annex P or be located more than 1.8 m above the floor if the entry of a conductive object from outside the equipment or from another part of the equipment can result in bridging an ES3 circuit to **accessible** conductive parts per clause 5.2 or bridging within PS3 circuits, unless protected by the control fire spread method in 6.4.6. Related to the 1.8 m height provisions, per IEC TR 62368-2, it is considered unlikely that a person would accidentally drop something that could consequently fall into the equipment at a height greater than 1.8 m.	Minor (-). Primarily a clarification, reducing the application of 4.9 to a slightly smaller set of constructions than before
4.10.3 Power supply cords	A new subclause has been added that a power supply cord for connection to mains is not considered external wiring (for flammability purposes), and such cords are covered by G.7. This clarification was provided to avoid the Clause 6 flammability requirements being applied to the insulation of power supply cords.	Minor. Clarification, which generally reflects present practice
4.10.4 Batteries and their protection circuits	To ensure that there is a general provision in the body of the standard (Clauses 1-10) that covers **batteries**, a new requirement has been added to the general requirements that **batteries** and their protection circuits shall comply with Annex M. This has been moved from its previous location in Subclause 7.6 of IEC 62368-1:2018.	Minor. Generally reflects present practice

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
5.2.1.1 Electrical energy source classifications – ES1	The previous statement in 4.2.1 that a **protective conductor** is a Class 1 electrical energy source has been moved to 5.2.1.1.	Minor. Clarification
5.2.1.3 Electrical energy source classifications – ES3	The previous statement in 4.2.3 that a neutral conductor is a Class 3 energy source has been moved to 5.2.1.3 .	Minor. Clarification
5.2.2.1 Electrical energy sources ES1 and ES2 limits – General	Since some **external circuits** may have communication or data signals superimposed on a voltage (typically DC), a clarification has been added to 5.2.2.1: "The classification of **external circuits** is done by using their normal operating voltage or current, disregarding the communication or data signals, except for ringing signals (see 5.2.2.6) and for audio signals (see 5.2.2.7)."	Minor (-). Generally reflects present practice, although should help promote consistent application
5.2.2.2 Steady state voltage and current limits (Table 4)	Mostly for clarity and application to voltages at high frequency, a variety of minor revisions have been made to Table 4. Additionally, clarification has been provided regarding how "electric shock current limits are taken from IEC 60479-1 and IEC 60479-2" and how $U_{RMS\ limit}$ is determined.	Minor. Not intended to be technical changes
5.3.1 Protection against electrical energy sources – General	Related to derived ES1 or ES2 circuits, e.g., accessible ES1 derived from ES3 in a switch mode power supply, the requirement has been editorially rewritten to attempt to simplify the structure of the requirement. Note that, although the term "derived" has been removed	Minor. Clarifications

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
	from the statement, it remains acceptable for an accessible ES1 circuit to be derived from an ES3 or ES2 circuit, e.g., load side of switch mode power transformer, as long as the transformer has **double** or **reinforced insulation** — this construction remains as an example in the associated note, with a new example added of a construction with an ES2 **mains**, i.e., telecommunication equipment where the ES2 **mains** and ES1 are earthed.	
5.4.1.10.3 Ball pressure test	The previous compliance statement, that "the test is not made if it is clear from examination of the physical characteristics of the material…" has been removed since this is a general consideration for all requirements.	Minor. Clarification
5.4.2.3.2.2 Determining AC mains transient voltages	Clarification is provided that when additional transient voltage protection is required, it may be provided external to the equipment or internal to the equipment. However, special installation instructions are only required when relying on such protection external to the equipment.	Minor (-). Clarification
	Table 12, Mains transient voltages, has been restructured to more clearly reflect both single-phase and three-phase supply systems consistent with IEC 60038, IEC standard voltages. Additionally, the table now more clearly associates the AC mains voltage with the nominal voltage of the supply system.	Minor. Likely reflects present practice, although there could be some impact on three-phase constructions or those operating at higher voltages than previously covered in Table 12

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
5.4.2.3.2.3 Determining DC mains transient voltages	To address consideration of transient voltages on DC mains, clarification has been added to the existing requirement (last paragraph) that the declaration of mains transient voltage on the DC mains supply shall be in the installation instructions, and "the declared **mains transient voltage** shall take into account the conditions mentioned above and shall as a minimum correspond to the overvoltage category of the equipment (see Annex I)."	Minor (+). Although this subclause is used infrequently, when used, there may need to be more detail added to the installation instructions.
5.4.2.3.2.4 Determining external circuit transient voltages (Table 13)	Since Table 13, External circuit transient voltages, has been difficult to relate/correlate to **external circuits** associated with actual products — e.g., twisted pair, Ethernet, LAN, PoE, CATV, etc. — an extensive restructuring and modification of this table has taken place in Ed. 4. This work was done by the ad hoc team working on modifications to **IEC TR 62102:2005**, Electrical Safety – Classification of Interfaces for Equipment to be Connected to Information and Communications Technology Networks, to update it and allow better coordination between IEC 62368-1 and IEC TR 62102. Note: The following previous condition to Table 13 has been removed, so there could be some additional impact on products with **external circuits** contained wholly within building structures — "In general, for EXTERNAL CIRCUITS installed wholly within the same building structure, transients are not taken into account."	Significant. Due to the extensive reworking of Table 13, there could be some direct impact on constructions previously compliant with a previous edition of this standard, although the full impact is not known at this time. Certainly, there will be some adjustment required due to the extensive revision of Table 13.
5.4.2.4 Determining the adequacy of a clearance using an electric strength test	To simplify application, the previous compliance provision that the DC voltage test is conducted in reverse polarity has been removed. As a result, this test now can be conducted in single polarity.	Minor (-). Change should simplify application of this test, although the intent is not to wholly disregard polarity.

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
	Note, for constructions that may be polarity-sensitive, sound engineering practice would be to conduct the test in the configuration that would provide the worst-case results.	
5.4.3.1 Creepage distances – General	Some values in Table 18, Minimum values of creepage distances for frequencies higher than 30 kHz and up to 400 kHz, had deviated from the source document, IEC 60664-4, so they were updated to align with the source document.	Minor. Will promote better consistency
5.4.3.4 Creepage distances – Compliance criteria	To clarify how to consider **creepage distance** on materials with multiple CTI values, a new paragraph has been added to 5.4.3.4, which states: "A **creepage distance** may be split into several portions of different materials and/or have different **pollution degrees** if one of the **creepage distances** is dimensioned to withstand the total voltage or if the total distance is dimensioned according to the material having the lowest comparative tracking index (CTI) and the highest **pollution degree**." This principle is consistent with IEC 60664-1.	Minor. Change will promote consistency
5.4.4.1 Solid insulation – General requirements	Added to the general requirements is a pointer to requirements that need to be applied later in the subclause: "When the **solid insulation** is exposed to frequencies above 30 kHz, the requirements of 5.4.4.9 also apply."	None. Editorial
5.4.5.1 Antenna terminal insulation – General	Another exception not requiring testing has been added for "equipment with only antenna terminals intended for connection to an indoor antenna only."	Minor (-). Reflects present practice

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
5.4.11.1 Separation between external circuits and earth – General	The previous association of the requirement with "external circuits indicated in Table 13, ID No. 1" has been removed, which makes the requirement potentially broader in application.	Minor (+). Potentially could have wider applicability to a wider range of products
5.5.2 Capacitors and RC units	Some coordinated changes, mostly editorial, have been made to 5.5.2 and G.11 to better coordinate with IEC 60384-14, Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification – Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains.	Minor. Will promote better consistency
5.5.2.2 Capacitor discharge after disconnection	Since **pluggable Type B equipment**, such as found in data center racks with PDUs, often have multiple sets of EMI components in the system, application experience has shown that it is difficult to comply with the current two-second limit associated with access to the plug after disconnection. However, as most **pluggable Type B equipment** are installed in data centers and other areas where direct/quick access to the plug is not common, especially within two seconds, Subclause 5.5.2.2 has been revised to reintroduce separate capacitor discharge time requirements for pluggable Type B equipment (five seconds) versus nonpluggable Type B (two seconds), which aligns it with a variety of other IEC and UL standards that allow for access at > two seconds.	Significant (-). Change will provide some reasonable relief to equipment with pluggable Type B plugs without compromising safety.
5.5.7 Surge suppressors (formerly SPDs)	To address concerns about what is felt by some as inappropriate use of terms, the initialism "SPD" has been universally replaced by **surge suppressor** in this latest edition.	None. Technical requirements have not changed due to this specific change.
	Currently, where a **surge suppressor** (SPD) is used between the **mains** and **protective earthing**, one of the provisions is that it shall	None.

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
	comply with the electric strength test per 5.4.9.1. However, since there are three tables in 5.4.9.1, a clarification has been added in 5.5.7 that the construction shall comply with a test voltage per Table 26 and Table 27 (since Table 25 is not applicable for this requirement).	Editorial; clarification and likely reflects present practice
	In the new Note 2, a statement acknowledges that in **Class II equipment**, surge suppressers are sometimes used between the **mains** and an **external circuit** as defined in **Error! Reference source not found.**, ID1 a, b or c to protect internal circuits from a lightning surge. The note points to IEC 62368-2:2022, Annex A, for information related to the use of surge suppressors for such applications.	None. Informative
	In Note 3, a reference to IEC 61051-2 (surge suppression varistors) was missing so it has been added.	None. Informative
5.5.8 Insulation between the mains and an external circuit consisting of a coaxial cable	For insulation between the **mains** and an **external circuit** consisting of a coaxial cable, the procedure for testing the combination of the insulation with the resistor has been clarified.	Minor. Clarification
	Furthermore, when constructions require an impulse test of G.10.5., it has been clarified that "When G.10.5 requires only a 4 kV impulse test, this 4 kV impulse test is not required if the insulation complies with the electric strength test in accordance with 5.4.9.1 with a minimum of 4 kV peak or DC." Additionally, it has been added that	Minor. Clarification

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
	"The resistor may be removed during the tests. During and after the tests, the insulation shall comply with 5.4.5.3."	
5.6.2.2 Colour of insulation	A new requirement has been added that for **functional earthing** conductors, the colour combination green and yellow shall not be used, except for multipurpose preassembled components (for example, multiconductor cables or EMC filters).	Minor (+). Considered mostly to be consistent with present practice, although it is conceivable there may be some constructions with green/yellow insulated conductors for functional earthing that may need to be changed
5.6.4.3 Compliance criteria	A previous reference to 5.6.6. in the compliance statement has been removed since 5.6.6 is no longer referenced in 5.6.4.1.	None. Editorial correction
5.6.5.1 Terminals for protective conductors – Requirements	Several revisions have been made to 5.6.5.1 and its requirements for terminals for **protective conductors**. It has been clarified that "Equipment required to have **protective earthing** shall have a main **protective earthing terminal**. For equipment with a detachable power supply cord, the earthing terminal in the appliance inlet is regarded as the main **protective earthing terminal**." Also, in two locations, it has been clarified that the minimum terminal sizes in Table 32 apply to all pillar, stud or screw-type terminals. Also, a **protective earthing** connection according to the relevant IEC standard is acceptable if it passes the test of 5.6.6.	Minor (-). The changes provide additional options for manufacturers, with additional clarifications that generally reflect present practice.

Clause 5 (Electrically caused injury)		
Subclause	**Discussion**	**Impact**
5.7.8 Summation of touch currents from external circuits	A series of editorial clarifications have been made to 5.7.8 to reflect alignment with the correct use of terminology and to promote consistent application.	Minor. Generally reflects present practice

Clause 6 (Electrically caused fire)		
Subclause	**Discussion**	**Impact**
6.2.2.2 Power source circuit classifications – Power measurement for worst-case fault	For power classification measurements associated with a worst-case fault within the load, 6.2.2.2 has been clarified: When taking the measurement, "Adjust the variable resistor, LVR, until the power source delivers the maximum power in a steady state and classify the power source according to 6.2.2.4, 6.2.2.5 or 6.2.2.6."	Minor. Clarification
6.2.2.5 Power source circuit classifications – PS2	Clarification has been added in 6.2.2.5 that "Circuits that have previously been evaluated and comply with Annex Q are considered not to be higher than PS2. All safeguards and requirements for PS2 apply. Note: Such circuits were typically tested according to IEC 60950-1." This clarification was added to help simplify situations where circuits investigated as LPS to IEC 60950-1 are submitted for further investigation as part of a certification to IEC 62368-1, where PS2 now will be the appropriate circuit classification. Such circuits previously classified as LPS should not require further PS2	Minor. Reflects present practice

Clause 6 (Electrically caused fire)		
Subclause	**Discussion**	**Impact**
	classification, but all the associated safeguards and requirements for PS2 apply. Although the legacy component provision in 4.1.1 is no longer in Ed. 4, such clarification, without formally equating LPS and PS2, may limit the amount of retest of such circuits/components/products.	
6.2.3.1 Classification of potential ignition sources – Arcing PIS	A new statement has been added that a manufacturer can declare any part as **arcing PIS** without testing.	Minor. Reflects present practice
6.2.3.2 Resistive PIS	Regarding the **resistive PIS** criteria, the previous structure of the statement was confusing due to its complexity, so the statement was rewritten as: "A **resistive PIS** is any part in a PS2 or PS3 circuit that, under **normal operating conditions**, **abnormal operating conditions** or **single fault conditions**, dissipates more than 15 W for longer than 30 s." Note: The legacy 100 W criteria (and disregarding the first three seconds) associated with the first 30 seconds of measuring a **resistive PIS** has been dropped to promote a more practical measurement without compromising safety.	Minor (-). Simplification of the requirement should allow for more consistent identification of **resistive PIS.**
	A new consideration has been added: "For the method Control fire spread,' with the exception of **secondary lithium batteries**, components and current-carrying parts in a PS2 circuit are considered not to be a **resistive PIS**."	Minor. Reflects present practice

Clause 6 (Electrically caused fire)		
Subclause	**Discussion**	**Impact**
	Additionally, it has been clarified that a **resistive PIS** is considered not to exist in a PS1 because of the limits of the power source.	Minor. Reflects present practice
	A new statement has been added that a manufacturer can declare any location to be a **resistive PIS** without testing.	Minor. Reflects present practice
6.3.1 Safeguards against fire under normal operating conditions and abnormal operating conditions – Requirements	Since its first edition, IEC 62368-1 has been a challenge to apply to **loudspeaker drivers** and assemblies due to their unique designs and incompatibility with some of the flammability options allowed for by IEC 62368-1. An ad hoc team looked into modification of the technical requirements and proposed that due to their unique design requirements and lack of any field incident data that provides evidence there is a product safety deficiency in their traditional design, **loudspeaker drivers** and assemblies should be exempted from most of the Clause 6 flammability requirements until either new requirements are proposed or new field incidents provide evidence of a deficiency in IEC 62368-1. IEC TC108 supported the proposal. It is noted that removing these requirements also makes IEC 62368-1 more consistent with IEC 60065 for these constructions.	Minor (-). Provides some design relief for manufacturers of loudspeaker drivers and assemblies without compromising safety, and generally reflects practice under IEC 60065
	Additionally, for associated grill cloth and foam, reference is made to a new test per Annex S.6 as an alternative — “grille covering material, cloth, and reticulated foam that comply with S.6.”	Minor (-). As the test methodology has been used commonly in the U.S. in the past, adding this option is expected to be helpful to manufacturers
6.4.3.1 Reduction of the likelihood of ignition under single-fault conditions in PS2	In the Reduce the Likelihood of Ignition method, 6.4.3.1 (second dash) has been modified to allow for single-fault condition testing to be conducted to determine whether combustible material outside an enclosure opening can catch fire. Previously, any combustible materials intersected by projections through the opening	Minor (-). Provides an additional design option for some constructions using this method

Clause 6 (Electrically caused fire)		
Subclause	**Discussion**	**Impact**
circuits and PS3 circuits	were assumed to catch fire, without a performance option.	
	Since a series of revisions to Clause 6 has disassociated PIS with PS2 circuits in the Control of Fire Spread method, the previous reference in 6.2.3.1 to arcing PIS and Control Fire Spread have been removed.	Minor (-). Limiting PIS considerations in PS2 circuits should simplify the application of Clause 6.
6.4.5.1 Control of fire spread in PS2 circuits – General	In IEC 62368-1:2018, there was a statement: "For the purposes of reducing the likelihood of fire spread in PS2 circuits to nearby **combustible materials**, circuits that meet the requirements of Annex Q are considered to be PS2 circuits." This statement was removed from 6.4.5.1 to segment requirements for equipment fire risk (PS) from requirements for external cable fire risk (LPS). (Note: There remains a reference to LPS in 6.2.2.5.) This provision was more important when IEC 62368-1 accepted IEC 60950-1-compliant power supplies as 60950-1 used LPS for classifying outputs. Now, manufacturers will need to use the PS2 criteria in 6.4.5.1 instead of LPS, although it is expected that most circuits that were classified as LPS also will meet PS2.	Minor (+). There may be some constructions that were previously qualified as having an LPS but do not meet PS2. However, this situation is not likely to be common.
6.4.5.2 Control of fire spread in PS2 circuits – Requirements	A series of revisions was developed by an ad hoc group to address some confusion with the Control of Fire Spread method, including, (a) key provisions of the two methods are now kept separate; (b) **potential ignition source (PIS)** is now primarily used for the Reduce the Likelihood of Ignition method only (except for qualification of openings in a fire enclosure/fire enclosure material); (c) any components and current-carrying parts in a PS3 circuit are a resistive PIS without testing; and (d) some additional restructuring of Subclause 6.4.5.2	Minor. The extensive revisions are intended to be mostly editorial in nature but should help promote more efficient and consistent application of Clause 6, control of fire spread requirements.

Clause 6 (Electrically caused fire)		
Subclause	**Discussion**	**Impact**
	See analysis in 6.3.1 related to **loudspeaker drivers** and assemblies.	Minor (-). Provides some design relief for manufacturers of **loudspeaker drivers** and assemblies without compromising safety, and generally reflects practice under IEC 60065
6.4.6 Control of fire spread in PS3 circuits	See the analysis in 6.3.1 related to **loudspeaker drivers** and assemblies. Note: Per **B.4.6, Short-Circuit or Disconnection of Passive Components**, loudspeakers remain a component that can be short-circuited or disconnected, whichever is more unfavourable.	Minor (-). Provides some design relief for manufacturers of **loudspeaker drivers** and assemblies without compromising safety, and generally reflects practice under IEC 60065
	As part of the Clause 6 ad hoc work, 6.4.6 has been clarified to add the following additional **supplementary safeguard:** "Varistors located less than 13 mm from an **enclosure** and that are made of **combustible material** shall comply with G.8.2."	Minor (+). Although potentially more onerous, expected to be consistent with present practice
6.4.7.1 Separation of combustible materials from a PIS – General	See the analysis in 6.3.1 related to **loudspeaker drivers** and assemblies.	Minor (-). Provides some design relief for manufacturers of **loudspeaker drivers** and assemblies without compromising safety, and generally reflects practice under IEC 60065
6.4.8.3.3 Top openings and top opening properties	Clarification has been provided that the 2 mm boundary associated with the Figure 41 fire cone also must be considered when applying requirements for top openings.	Minor (+). Although potentially more onerous, expected to be consistent with present practice

Clause 6 (Electrically caused fire)		
Subclause	**Discussion**	**Impact**
6.4.8.3.4 Bottom openings and bottom opening properties	Similarly, as done for top openings, clarification has been provided that the 2 mm boundary associated with the Figure 41 fire cone must be considered when applying requirements for bottom openings.	Minor (+). Although potentially more onerous, expected to be consistent with present practice
	Additionally, based on the application of IEC 60950-1 and the legacy allowance of some certifiers to allow an extended bottom surface outside the fire enclosure to be considered part of the bottom fire enclosure, a new provision and figure (44) has been added to this subclause. It states, "For professional equipment intended for use in environments where combustible materials are unlikely to be adjacent to the product (for example, data centers and server rooms), extended bottom surfaces may be considered a suitable **fire enclosure** as illustrated in Figure 44 if the bottom surface complies with 6.4.8.3.4."	Minor (-). For constructions that require the consideration covered by this new provision and figure, the requirement is less onerous than previous.
6.4.8.3.5 Side openings and side opening properties	The ad hoc group that had worked on refined side and bottom opening requirements in the past also proposed a new provision and figure (44) that allows for the thickness of a side opening to be considered when qualifying compliance with the fire enclosure requirements. It states, "Side openings that comply with the maximum dimensions as illustrated in Figure 45 are considered to meet the requirements of this subclause without further consideration." Similar material has also been added to Annex P.2.3, Safeguards Against the Consequences of Entry of Foreign Objects.	Minor (-). For constructions that require the consideration covered by provision (d) of 6.4.3.4, the requirement is less onerous than previous requirements.

Clause 6 (Electrically caused fire)		
Subclause	**Discussion**	**Impact**
	See IEC TR 62368-2 for a more extensive background.	
6.4.9 Insulating liquids	IEC 62368-1:2018 contained Table 34, List of applicable IEC standards regarding insulating liquids, which had a list of miscellaneous standards that directly or indirectly covered insulating liquids. However, although the list was included as a normative requirement, during application the table introduced confusion on how these standards should be applied since the standards typically cover aspects beyond product safety and, in practice, they are used more as reference standards. Therefore, a decision was made to move them from IEC 62368-1 into IEC TR 62368-2.	Minor. The requirements for insulating liquids have not been used frequently to date, so relocating this normative table from IEC 62368-1 into IEC TR 62368-2 is not considered to have a significant impact.
6.5.2 Requirements for interconnection to building wiring	Clarification has been added to 6.5.2 that the requirements apply under **normal operating conditions** or external fault conditions.	Minor. Clarification that generally reflects present practice
	Also, it has been clarified that the 1.3 A current limitation for external paired conductor cable circuits is to be considered as either an RMS or DC.	Minor. Clarification that generally reflects present practice
6.6 Safeguards against fire due to connection of additional equipment	Since the requirement in Subclause 6.6 applies to a variety of constructions and applications, the limited number of examples (mouse, keyboard, etc.) previously noted in IEC 62368-1:2018 have been removed.	Minor (-). Clarification that generally reflects present practice
	The previous allowance that power levels delivered to connected equipment or accessories may comply with either PS2 or Clause Q.1 has been modified to remove the reference to Q.1 since Q.1 is associated with equipment supplying power to building wiring, which was causing confusion in the context of 6.6.	Minor. Generally reflects present practice

Clause 7 (Injury caused by hazardous substances)		
Subclause	**Discussion**	**Impact**
NA		

Clause 8 (Mechanically caused injury)		
Subclause	**Discussion**	**Impact**
8.12 Telescoping or rod antennas	Since the requirements in Ed. 3 for antennas were considered too prescriptive for all applications, including modern commercial products, Subclause 8.12 has been revised to place more emphasis on safeguards being required for equipment likely to be used in locations where children may be present, and allowing for a more subjective engineering judgment on constructions that do not pose a risk of injury.	Minor (-). The modified requirements should allow for more engineering judgment to be applied to previously impacted devices even when risk of injury was unlikely.
8.5.4.3.1 Equipment having an electro-mechanical device for destruction of media – General requirements	To limit unneeded application of the instructional safeguard regarding use of the equipment around children per Clause F.4, it has been clarified that the instructional safeguard requirement is not required when it is obvious that children will not be present, such as for a light industrial-type paper shredder.	Minor (-). Will exempt the required application of this instructional safeguard when it is obvious that children should not be present when the equipment is used

Clause 9 (Thermal burn injury)		
Subclause	**Discussion**	**Impact**
9.2 Thermal energy source classifications	Several minor editorial revisions have been made to the classifications of TS1 and TS2 thermal energy sources that are intended to provide clarification on intent, but not change the technical requirement.	Minor. There were no intended technical changes in these revisions.

Clause 9 (Thermal burn injury)		
Subclause	**Discussion**	**Impact**
9.3.1 Touch temperature limits – Requirements, including Table 37, Touch temperature limits for accessible parts	Due to the unique thermal burn considerations associated with wearable devices and the fact that such devices are typically in constant contact with the skin, the requirements for TS1 have been made more onerous for wearable devices, now requiring that TS1 limits remain the same under normal, abnormal and single-fault conditions and not rise to above the limits for TS1 (as shown in the TS2 row). Although this change was not made to the TS1 and TS2 classifications directly, this change has been directly incorporated into Table 37.	Significant (+). Although not many wearable devices are certified to IEC 62368-1 yet, this more onerous requirement could impact the design of some wearable devices.
9.3.2 Test method and compliance criteria	The previous reference to B.2.3 for supply voltage has been removed since it was not considered relevant to ambient conditions as noted in this clause.	Minor (-). Should simplify application
9.4 Safeguards against thermal energy sources	In IEC 62368-1:2018, the special provision for accessible parts that require heat for intended function included reference to both TS2 and TS3 parts. However, accessibility to TS2 parts is already permitted by ordinary persons if there is an instructional safeguard, so TS2 has been removed from this provision.	Minor (-). Provides further clarity on intended application
9.6.1 Requirements for wireless power transmitters – General	Although the most prominent wireless power transmitters are flat surfaces, some transmitters are being introduced in other orientations, such as sloped, e.g., smart phone leans against the transmitter. As the Wireless Power Consortium (WPC) is currently developing requirements for other than flat surfaces, and the requirements in 9.6.1 are based on the WPC requirements, a new statement has been added that the requirements in 9.6.1 apply to wireless power transmitting **devices** that have substantially flat surfaces. If a transmitter other than flat-surface orientation is submitted, it likely would be	Minor. Subclause 9.6 will not be applied automatically to constructions with other than a flat surface.

Clause 9 (Thermal burn injury)		
Subclause	**Discussion**	**Impact**
	addressed under 4.1.5, Constructions Not Specifically Covered.	
9.6.3 Requirements for wireless power transmitters – Test method and compliance criteria	During application of 9.6.3, there have been several questions raised on correct application, partially driven by similarities in 9.6.3 to the WPC Qi specification as the Qi specification has similar tests to 9.6.3 and the Qi specification served as the original core material for 9.6.3. Since the 9.6.3 tests are like those run for Qi qualification, this naturally draws scrutiny to any differences in the stated test methods. While it is not the intent of IEC TC108 to make both sets of tests the same, common application considerations drove numerous revisions to 9.6.3.	-See below
	To help address the application of the requirements specifically for 9.6.3, the test has been broken into two parts, Part A and Part B. Part A consists of powering up the transmitter and then placing the foreign objects on it, and Part B consists of placing the foreign objects on the transmitter and then powering it up.	Minor. The modifications should promote consistency in the application of 9.6.3.
	Also, based on these requirements in 9.6.3 coming from the WPC requirements, which use a frame and spacers to promote consistency of measurements, similar criteria have been added into 9.6.3, although use of a frame is only one method that may be used to provide a reliable methodology, with tape given as another possible method.	Minor (+). For manufacturers producing wireless power transmitters, the stipulation of frames and spacers may drive the need for additional test equipment.
	Through editorial changes, additional emphasis is provided that the requirements in 9.6.3 are for determining the touch temperatures associated with the foreign objects placed on the transmitter, and not the receiver.	Minor. The modifications should promote consistency in the application of 9.6.3.

Clause 9 (Thermal burn injury)		
Subclause	**Discussion**	**Impact**
	Touch temperatures for receivers are subjected to the general Clause 9 touch temperature requirements, but not 9.6.3.	
	Aligned with the changes made to 9.6.1 related to flat-surface orientation, it has been clarified that the receiver is placed at a vertical distance from the foreign object. It should be noted that some additional clarifications (examples) on application have been added into 9.6.3 of IEC TR 62368-2.	Minor. Clarification on intended application consistent with current practice
	Due to the different types of specified foreign objects and based on additional research submitted as technical rationale (some of which is referenced in IEC TR 62368-2) that supported higher limits, the touch temperature limits in 9.6.3 have been adjusted accordingly to 85°C for steel disks, 120°C for the aluminum ring and 155°C for the aluminum foil. It is noted that these limits are different (higher) than those in the Qi specification.	Minor (-). These more realistic limits should assist manufacturers of transmitters to comply with the touch temperature limits, although it is unclear whether the limits in the WPC Qi specification will also be changed.
	Also, as the transmitter may also be touched, it has been stipulated that the temperature of the transmitter shall not exceed the TS2 limits specified in Table 37.	

Clause 10 (Radiation)		
Subclause	**Discussion**	**Impact**
NA		

Annexes		
	Discussion	**Impact**
B.1.5 Normal operating condition tests, abnormal operating condition tests and single-fault condition tests – Temperature measurement conditions	As a clarification on how multiple or a range of supply voltages is to be considered, a new statement has been added to B.1.5: "For **normal operating conditions**, measurements are made with the EUT operating at the most unfavourable supply voltage; see B.2.3." This was added to attempt to reduce the total amount of temperature measurement testing, with the most unfavourable supply voltage as described in B.2.3 being determined to some degree by engineering judgment.	Minor. Generally reflects present practice
B.1.6 Specific output conditions	To address constructions, in particular switch mode power supplies, which often require a load with specific characteristics before the power supply will supply power, a new subclause has been added to provide guidance for such conditions. Although this would seem common sense, some IECEE CB test reports have been observed with output voltage/current/power documented as zero (0) because the proper load was not connected to the output. It is hoped that this new guidance will address the situation.	Minor (+). Although technically a set of clarifications, since some NCBs may not have tested with a proper load to initiate power delivery, there may be some impact when B.1.6 is applied correctly.
B.2.4 Normal operating voltages	In the context of normal operating voltages, it has been clarified that normal operating voltages generated externally to the equipment for all the IDs in Table 13 shall be considered, including ringing signals received from external circuits for Table 13, ID numbers 1a, 1b, 1c and 2.	Minor (+). There could be some limited impact if voltages other than ringing signals have not been considered, but current constructions are considered likely to be compliant.
B.2.5 Input test	The impact of the 10% allowance for the input test (vs. rated current or rated power) per B.2.5 can have different implications depending on whether the equipment is mains-connected or	Minor (+). Revision should promote more consistent application of the requirement to

Annexes		
	Discussion	**Impact**
	not. The paragraph below has been modified to make this distinction. "For equipment supplied by the **mains**, the measured input current or input power under **normal operating conditions**, but at the **rated voltage** or at each end of each **rated voltage range**, shall not exceed the **rated current** or **rated power** by more than 10%, short-term conditions not being taken into account. For equipment not supplied by the **mains**, the measured input current or input power shall be less than or equal to the ratings of the equipment."	equipment not connected to the mains, but since the 10% allowance is no longer considered for equipment that is not mains-connected, there could be some impact.
B.2.6.4 Equipment intended for building-in or rack-mounting	This new Annex B provision is based on 5.4.1.4.2 of IEC 62368-1:2018, which has been moved here as a more general condition.	Minor. Generally reflects present practice
B.3.5 Maximum load at output terminals	Since some modern power supplies and other power sourcing equipment won't provide output power unless a load with certain characteristics is present, a clarification has been added: "The source needs to be connected to a terminating **device** or impedance that turns on the source voltage or current and creates the worst-case **abnormal operating condition**."	Minor (+). As has been observed, some NCBs are recording the output characteristics of certain power sourcing equipment (PSE) as 0 A/0 V/0 W, this clarification will attempt to reduce this practice.
B.4.1 Simulated single-fault conditions – General	IEC 62368-1:2018 indicated that a failure of functional insulation was to be considered when required by B.4.4. However, this reference was in essence circular since B.4.4 contains the requirements for the functional insulation, not the requirement that failure	Minor. Generally reflects present practice

Annexes		
	Discussion	**Impact**
	needs to be considered. Thus, the reference to B.4.4. has been removed. It is noted that B.4.4 only applies when the Reduce the Likelihood of Ignition evaluation path is chosen (6.4.3.2).	
B.4.4 Functional insulation	A series of revisions have been made to B.4.4 to better clarify when and how the requirements for **functional insulation** are applied. As by definition, **functional insulation** is not a **safeguard**, there has been some confusion about why there are requirements for **functional insulation in** the standard. However, as improperly designed **functional insulation** can cause secondary effects, e.g., thermal, the standard has requirements for **functional insulation**. Also included is additional refinement of the allowances for printed boards in **Pollution Degree** 1 and **Pollution Degree** 2 environments so that they can rely on clearances or creepage distances specified in IEC 60664-1:2020, Table F.5.	Minor. Generally reflects present practice
Annex E (normative) Test conditions for equipment containing audio amplifiers	Annex E has been wholly revised since it was difficult to apply to modern audio amplifiers with state-of-art technology. Some additional provisions originally part of IEC 60065 were also added to it. This rewrite also drove some additional changes to other parts of IEC 62368-1, such as adding a new Clause 3 definition of pink noise and adding references to Annex E in 6.2.2.3, B.2.5 and B.3.7.	Minor. The intent of the changes was to make a more appropriate set of requirements that reflect modern design without adding new requirements.

Annexes		
	Discussion	**Impact**
F.1 Equipment markings, instructions, and instructional safeguards – General	Related to the application of Annex F to **components** and **subassemblies**, some new material has been added, differentiating between both.	Minor. Generally reflects present practice
F.2.2. Graphical symbols	A new stipulation has been added that, for any nonstandard graphical symbols designed for a specific application or equipment, the meaning of the symbol is required to be described in the user manual.	Minor (+). Although a new requirement, considered to be consistent with current practice
F.3.1 Marking location requirement	Changes — mostly editorial and structural — have been incorporated into F.3.1 to address some differences of opinion on how F.3.1 should be interpreted regarding (a) general location of required markings, and (b) where equipment (nameplate) markings may be located.	Minor. Intended to be editorial clarifications
F.3.3.4 Rated voltage	Several relatively minor editorial revisions have been made on the details required for the rated voltage and its location.	Minor. Intended to be editorial clarifications
F.3.5.3 Replacement fuse identification and rating markings	Based on how IEC 60950-1 addressed the concern, a set of modifications has been made to the requirements for fuses installed in equipment with a nonpolarized plug and for equipment with neutral fusing.	Minor. Generally reflects present practice, but there could be some minor impact
F.3.6.2 Equipment class marking	Although **Class II equipment** with **functional earthing** has already been technically required to be supplied with the IEC 60417-6092 (2013-03) **functional earthing** symbol, the numerous variations of equipment with **functional earthing** led to the need to be more specific about which **Class II equipment** with **functional**	Minor. The intent of the revisions is not to add more requirements but promote more consistent application of F.3.6.2.

Annexes		
	Discussion	**Impact**
	earthing needed to be marked per F.3.6.2. To address the situation, an ad hoc group developed more expansive wording for F.3.6.2, along with some illustrative examples that are being added to IEC TR 62368-2.	
F.3.7 Equipment IP rating marking	To help promote consistency of use of an IP rating marking in AV/ICT equipment, the existing requirement has been revised to state that where an IP construction is used as a **safeguard**, it shall be in accordance with IEC 60529, and the IP code shall be declared either in the manual or on the equipment.	Minor. Generally reflects present practice, but there could be some minor impact
F.3.8 External power supply output marking	Editorial modifications have been made to F.3.8 that clarify the external power supply output marking requirements.	None. Editorial, and generally reflects present practice
F.4 Instructions	A clarification has been added that when a full **instructional safeguard** is placed on the equipment in accordance with F.5, there is no need to additionally explain the symbol in the instructions.	Minor (-). Generally reflects present practice
G.1 Switches – Requirements	A series of editorial corrections have been made to G.1 to correct inaccurate subclause numbers that were referenced.	None. Editorial
G.2 Relays – Requirements	A series of editorial corrections have been made to G.2 to correct inaccurate subclause numbers that were referenced.	None. Editorial
G.3.5.1 Safeguard components not mentioned in G.3.1 to G.3.4 – Requirements	A new requirement has been added that fuse resistors used as a **safeguard** in the **mains** shall comply with IEC 60127-8.	Minor (+). Although this requirement is new, most components comply with the appropriate component standard as compliance to IEC 60127-8 has previously been a consideration in Europe.

Annexes		
	Discussion	**Impact**
G.7 Mains supply cords and interconnection cables	To reflect its contents more accurately, the title to G.7 has been changed to “Mains supply cords and interconnection cables.” See G.7.3.1.	None. Editorial
G.7.1 Mains supply cords and interconnection cables – General	To accommodate use of halogen-free sheathed mains supply cords, references have been added to IEC 63010-1, IEC 63010-2, IEC 62821-1, IEC 62821-2 and IEC 62821-3. Per IEC TR 62368-2, alternative cords to rubber and PVC are accepted to allow for PVC-free alternatives to be used. At the time of development of the document, IEC TC20 had no published documents available for these alternatives. However, several countries do have established requirements. Therefore, it was felt that these alternatives should be allowed.	Minor (-). Impact will likely be minor in IEC 62368-1 as use of specific power cords is typically driven by in-country requirements
G.7.3.1 Cord anchorages and strain relief – General	The requirements in G.7.3 have been expanded to also apply to interconnecting cables when **safeguards** against strain being transmitted to the equipment terminations of the interconnecting cables are connected to ES2 circuits, ES3 circuits or PS3 circuits.	Minor (+). Additional requirement for interconnect cables, which reflects present practice of some NCBs
G.8.2.2 Varistor overload test	For the varistor overload test, the details for the resistors to be used for the test have been modified slightly to align with the latest source standards of these tests.	Minor. Could be some limited impact due to the change

Annexes		
	Discussion	**Impact**
G.11.3 Capacitors and RC units – Rules for selecting capacitors	In IEC 62368-1:2018, there was some simplification of Table G.12 to remove some of the rules for selecting capacitors. However, this simplification was driving additional application questions due to the close alignment of Table G.12 and IEC 60384-14. Therefore, additional work was conducted to add additional rules into Table G.12 that are intended to improve the efficient and consistent application of G.11.3.	Minor. Should promote more efficiency and consistent application of G.11
	A statement was added to G.11.3 referencing Table G.12 that it is based on evaluation of clearance and creepage distances for Pollution Degree 2 (based on IEC 60384-14), and this should be considered. For Pollution Degree 3 applications, different values may apply.	Minor. The condition will need to be taken into consideration for environments other than PD2, although it's not clear what the alternative values are.
G.15.1 Pressurized liquid-filled component or LFC assemblies – Requirements	To accommodate new requirements for **modular LFCs**, which have been added to supplement the existing requirements for **self-contained LFCs**, a series of changes have been made to G.15 throughout. The new requirements for **modular LFCs** are in G.15.3, although a provision in G.15.1 also permits an LFC or **LFC assembly** complying with IEC 61010-1 to be considered to comply without additional testing or evaluation. Subclause G.15 of IEC TR 62368-2 should be consulted for additional background material.	Significant (+). As the existing requirements for **LFCs** have been limited to systems with less than 1 liter of liquid, the **modular LFC** requirements are likely to have considerable impact on manufacturers, although some NCBs have already been applying requirements in the context of 4.1.5, such as drawing requirements from IEC 61010.
G.15.2.1 Hydrostatic pressure test	Based on the work done for **modular LFCs**, with additional survey research conducted to determine typical hydrostatic test time lengths in other standards, the test time for **self-contained LFCs** has been reduced to one minute.	Minor (-).

Annexes		
	Discussion	**Impact**
G.15.2.7 **Test methods and compliance criteria for self-contained LFC – Compliance criteria**	Since the legacy **self-contained LFC** requirements did not have a compliance statement, one has been added as G.15.2.7.	Minor.
G.15.3 **Test methods and compliance criteria for modular LFC**	The new test methods and compliance criteria for **modular LFCs** are contained in G.15.3, and include: G.15.3.1 – General G.15.3.2 – Hydrostatic pressure test G.15.3.3 – Creep resistance test G.15.3.4 – Tubing and fitting compatibility tests G.15.3.5 – Thermal cycling test G.15.3.6 – Force test G.15.3.7 – Compliance criteria See Subclause G.15 of IEC TR 62368-2 for background information on why vibration testing was not included in the requirements for **modular LFCs**.	See G.15.1.
G.16.2 **IC that includes a capacitor discharge function (ICX) – Tests**	Annex G.16.2 requires that impulses be superimposed on the **mains** voltage. To help standardize application, a new paragraph has been added: "Where a coupling/decoupling network (CDN) is used to perform the superimposition, Subclause 7.2 and 7.3 of IEC 61000-4-5:2014+A1:2017 or Annex A of ITU-T Recommendation K.44 provide detailed guidance for the test setup."	Minor (+). Generally reflects present practice

Annexes		
	Discussion	**Impact**
I **Overvoltage categories**	Clarification has been provided on consideration of the overvoltage category of DC power distribution systems: "For the overvoltage category of DC power distribution systems, see 5.4.2.3.2.3 and Table 12 using the **DC mains voltage** value as the value for the AC **mains** voltage in Table 12."	Minor. Clarification
J.2.3 **Flexibility and adherence**	A maximum force of 100 N for winding on the mandrel has been added during the flexibility and adherence tests for insulated winding wires for use without interleaved insulation.	Minor. Clarification
L.1 **Disconnect devices – General requirements**	It has been clarified that direct plug-in equipment may be considered a disconnect device per Annex L.	None. Generally reflects present practice
L.7 **Plugs as disconnect devices**	Consistent with the change made to L.1, the previous reference to a plug on a power supply cord only being associated with a disconnect device has been removed since the plug associated with direct plug-in equipment may also be considered a disconnect device.	None. Generally reflects present practice
L.8 **Multiple power sources**	Clarification has been provided that this subclause is not applicable to equipment supplied from ES1 and in which ES2/ES3 is not generated.	Minor (-). Generally reflects present practice
M.1 **Equipment containing batteries and their protection circuits – general requirements**	A statement has been added that this annex also applies to a removable battery to be charged with an external battery charger if they are associated with AV/ICT equipment.	Minor. Generally reflects present practice

Annexes		
	Discussion	**Impact**
	An editorial revision has been made clarifying the requirements that only apply to nonrechargeable consumer-grade primary batteries — mainly M.3 and M.10.	None. Editorial
M.2.1 **Safety of batteries and their cells – Requirements**	It is relatively common that in stationary equipment, small batteries and battery packs used for subsystem powering are not designed to comply with IEC 62619, but do comply with the IEC 62133-series standards. As the HBSDT supports this (and there is a similar ND in the CAN/U.S. standard), a new allowance has been included: "For **batteries** used for subsystem powering applications in **stationary equipment**, IEC 62133-2 may be used as an alternative to IEC 62619." Also see M.4.1.	Minor (-). This allowance has been part of a CAN/U.S. ND for several years and is now being carried over into global certification practice.
M.4.1 **Additional safeguards for equipment containing a secondary lithium battery – General**	IEC TC 108 holds that most of the provisions in M.4.1 apply both to portable and nonportable equipment with secondary lithium batteries. Therefore, the title of M.4.1 has been changed and the main requirement has been revised to state, "Equipment designed to be operated while incorporating one or more **secondary lithium batteries**, except for secondary lithium coin-cell **batteries** with an internal resistance greater than 3 Ω, are subject to the requirements in this clause. For measuring the internal resistance of the **cell**, see Annex D of IEC 62133-2:2017." Secondary lithium coin-cell **batteries** with an internal resistance greater than 3 Ω are	Minor (+). Although the revision appears considerably more onerous, as most applications of M.4.1 have been to portable applications, the expanded application should have limited impact.

Annexes		
	Discussion	**Impact**
	exempted due to their lower energy levels and to be consistent with IEC 62133-2.	
	Since IEC 62619 contains more onerous requirements for **batteries** used in stationary applications, if electric, electronic and software controls are relied upon as a safeguard, IEC TC108 holds that a similar level of safety should be applied for IEC 62133-compliant **batteries** used in stationary applications. Therefore, the following requirement has been added: "For **batteries** complying with IEC 62133-2 and used for subsystem powering applications in **stationary equipment**, where electric, electronic and software controls and systems are relied upon as a **safeguard**, shall in addition either: – comply with 8.1 of IEC 62619; or – be protected by a **supplementary safeguard**. Such a **supplementary safeguard** may be in accordance with G.3, Annex F of IEC 62133-3, a **fire enclosure** in accordance with 6.4 in addition to the **enclosure** of the **battery**, or some other equivalent **safeguard** shall be: • in accordance with G.3; or • in accordance with Annex F of IEC 62133-2:2017; or • a **fire enclosure** in accordance with 6.4 in addition to the **enclosure** of the **battery**; or • some other equivalent **safeguard**." See IEC TR 62368-2 for more detailed background information.	Minor (+). Some battery packs used in stationary ICT either don't use electric, electronic or software controls that are relied upon as a safeguard, or, if they do, they have a supplementary safeguard. Therefore, this requirement is considered a minor impact for most applications but could have a greater impact on some.

Annexes		
	Discussion	**Impact**
M.4.2 Charging safeguards	Based on the work of an ad hoc group, the requirements for charging safeguards in M.4.2 have been completely restructured and rewritten to promote clarity on the intent and promote consistency.	Minor. Although the intent of the rewrite was not to introduce new requirements, there could be some unintended consequences. However, the rewrite should promote better consistency and efficiency in application.
M.4.3 Fire enclosure	It has been clarified that equipment with **batteries** is exempt from the fire enclosure requirement in M.4.3 if the equipment uses a **cell** or a combination of **cells** that complies with PS1.	Minor (-). Generally reflects present practice
	Additional clarification has been provided on how to consider a **fire enclosure** as part of the end product meeting M.4.3.	Minor.
	Additional clarification has been provided on how to consider a **fire enclosure** that is part of the battery itself, including an opening limitation of 3 mm consistent with Clause 6 bottom opening requirements.	Minor. Generally reflects current practice
M.10 Instructions to prevent reasonably foreseeable misuse	To help simplify and clarify the requirements for instructions to prevent reasonably foreseeable misuse of batteries, M.10 has been restructured and rewritten. It now has less prescriptive details and allows more judgment to be made on inclusion of details associated with instructional safeguards.	Minor (-). The restructuring and rewrite provide a more practical set of requirements.
Annex O Measurement of creepage distances and clearances	Figures O.3 and O.4 have been revised based on some feedback from IEC TC 109, responsible for the IEC 60664-1 series. Of a special note: Fig O.4 now permits inclusion of measurements (d+D) even when the distance is < X related to an intervening unconnected conductive part.	Minor (-). Allows for possible reduced clearances and creepage distances

Annexes		
	Discussion	**Impact**
P.2.1 Safeguards against entry of foreign object – General	Like the changes made to 6.4.8.3.5, Side openings and side opening properties, with its new Figure 45, a new provision and Figure P.3 have been added to P.2.1 to allow for side openings where the thickness of the **enclosure** material meets the attributes as described in the new Figure P.3.	Minor (-). Allows for an additional option for manufacturers
P.2.2 Safeguard requirements	Side openings of a **fire enclosure** meeting the requirements of 6.4.8.3.5 are now included as an option to comply with this subclause.	Minor (-). Allows for an additional option for manufacturers
P.3.3 Spillage safeguards	If spillage because of a single fault condition is not already covered by application of B.4, a new consideration has been added to P.3.3: "If **LFC** or an **LFC assembly** bursts or relieves its pressure, the **coolant** cannot defeat a **safeguard**."	Minor (+). Although a new consideration, generally considered consistent with present practice
Q.1.1 Limited power source – Requirements	Currently, Annex Q allows for an IC current limiter complying with Clause G.9 in an LPS to establish an LPS output. Although G.9 has a 5 A output limit, it does not have a voltage limitation. This was overlooked when Q.1.1e) was modified to refer directly to G.9 instead of Table Q.1. To rectify this situation and prevent IC current limiters greater than 60 V DC from establishing LPS, Q.1.1e) has been further modified: "e) an IC current limiter with a nominal output voltage rating not exceeding 60 V DC that complies with Clause G.9."	Minor. Generally reflects present practice, but should prevent misapplication of the intent of LPS
Q.1.2 Test method and compliance criteria	For limited power source (LPS) measurements, for the output voltage, Uoc, which is referenced in Tables Q.1 and Q.2, the measurement has been simplified by removing two references to B.2.3.	Minor (-). Removing reference to B.2.3 for Uoc should simplify this basic measurement.

Annexes		
	Discussion	**Impact**
S.2 **Flammability test for fire enclosure and fire barrier integrity**	To promote consistency, the statement, "When testing the integrity of top openings, the top openings are to be covered with single layer of cheese cloth," has been moved to the first compliance paragraph.	None. Editorial
	Related to the section of this subclause covering Subclause 9.3 of IEC 60695-11-5:2016, Application of needle flame, since the needle flame test is used for two separate purposes, either (a) to test and qualify combustible materials, or (b) to test and qualify top openings, this subclause has been rewritten to cover both uses of this test.	Minor. Generally reflects present practice
S.6 **Grille covering material, cloth and reticulated foam**	A new option has been added to Annex S for qualifying the flammability of grille coverings, cloth and reticulated foam via use of a hexamethylene-tetramine (C6H12N4) fuel tablet. This methodology has previously been part of UL 60065 and some other furnishings standards.	Minor (-). As this test methodology has been used commonly in the U.S. in the past, adding this option is expected to be helpful to manufacturers.
T.1 **Mechanical strength tests**	Another consideration has been added that must be taken into consideration before exempting testing of handles, levers, knobs, the face of CRTs or transparent or translucent covers of indicating or measuring **devices**. Testing is conducted if an axial force is likely to be applied to the handle, lever, knob or cover under **normal operating conditions**.	Minor (+). Generally reflects present practice

Annexes		
	Discussion	**Impact**
V.1.3 Test method 2 – Openings tested with straight, unjointed test probes	As the original Figure V.1 probe was never designed to be used in an unjointed version, a note to V.1.3 has been added: "The test with the unjointed version is to see if test finger can be forced through the opening. The use of the jointed version may result in the test finger joints bending before the required force is reached."	Minor. Clarification
Annex W Comparison of terms introduced in this document	Several changes have been incorporated into Annex W, including a new comparison of mains supply (IEC 60664-1) vs. mains (62368-1), and revisions of the IEC 60664-1 definitions of solid insulation, rated impulse voltage, type test, routine test and temporary overvoltage based on the latest IEC 60664-1:2020 standard.	Minor. Update of informative annex
Y.3.2 Construction requirements for outdoor enclosures – Test apparatus	As the reference to ISO 3231 was obsolete, the reference for the test chamber has been changed to ISO 22479. A reference to ISO 22479 has also been added to Y.3.3, Water–saturated sulphur dioxide atmosphere.	Minor. Generally reflects present practice
Y.6.1 Mechanical strength of enclosures – General	The compliance statement has been modified to correct an error, now stating, "After the test, the level of protection shall remain in accordance with Y.5.1 and 4.4.3.10."	Minor. Corrects an error