



# The evolution of IEC 62368-1.

Keeping up with the changes in the 3rd edition.

As the pace of new product introductions increases, the line between “traditional” audio video devices and ITE (Information Technology Equipment) is changing beyond recognition. The International Electrotechnical Commission’s IEC 62368-1 standard was created to revise the existing IEC 60065 and IEC 60950-1 designations and to provide a new “hazard-based” standard covering both electronic equipment and IT/ Communication technology. This new “hybrid” standard is intended to be more performance-oriented and technology-independent, and to allow more design freedom.

With the 3rd edition published in October 2018, the key updates include the addition of requirements for outdoor equipment, wireless power transmitters, work cells, fully insulated winding wires and insulating liquids. Furthermore, it describes requirements for optical radiation and sound pressure. This data sheet highlights the key changes to the standard to help you comply with its requirements in order to optimize your supply chains.

## COVERING A WIDE RANGE OF PRODUCTS

IEC 62368-1 (3rd edition) applies to a wide range of electrical and electronic equipment in the fields of audio, video, information and communication technology.

It also covers business and office machines with a rated voltage not exceeding 600V, such as power supplies, servers, computer monitors, televisions, laptops, personal computers and computer peripherals.

In addition, IEC 62368-3 contains requirements for equipment supplying DC power over commonly used communication cables, such as USB or Ethernet (PoE).

IEC 62368-3 does not apply to

- Equipment supplying power using proprietary connectors.
- Equipment using a proprietary protocol for power selection.

## STANDARDS UPDATES

IEC	Edition	Year	Status
62368-1	2nd	2014	Voluntary, TRF is published and ready for testing
62368-2	2nd	2015	Explanatory info related to IEC 62368-1:2014
62368-3	1st	2017	Shall be taken into account for all products with USB and PoE ports
62368-1	3rd	2018	Voluntary, wait for announcement of TRF

Standards	Publication Date	Enforcement Date
EN 62368-1:2014 + A11: 2017	Aug 1st, 2014	Dec 20th, 2020
EN 62368-1:xxxx (3. Ausgabe)	Q4, 2018 or Q1, 2019	To be determined
UL 62368-1:2014 (2. Ausgabe) C22.2 Nr.62368-1-14	Dec 1st, 2014	Dec 20th, 2020 to replace UL 60950-1 and UL 60065
UL 62368-1:xxxx (3. Ausgabe) C22.2 Nr.62368-1-14:xxxx	Q4, 2018 or Q1, 2019	To be determined
JIS C62368-1:2018 (J 62368-1 (H30))	Jan 22nd, 2018	July 20th, 2018
AS.NZS 62368-1:2018	Feb 15th, 2018	July 02nd, 2018

## INTERNAL AND EXTERNAL COMPONENTS AND SUBASSEMBLIES

To provide a smooth transition to the new standard, the 1st, 2nd and 3rd editions of IEC 62368-1 will continue to accept internal and external components and subassemblies that are in accordance with the final versions of IEC 60065 and IEC 60950-1.

This includes products such as ICX, bleeder resistors, wire or external power supplies. They will be accepted without additional evaluation, unless the intended application of the device entails an operation at ambient temperatures of 50°C or more (which exceeds the 40°C limit in IEC 60065 and IEC 60950-1).

IEC 62368-1, evaluated at IEC 60950-1 (see clause 1.5.1 in version A2) and IEC 60065 (see clause 3.4 in the 8th edition) are also acceptable. However, these exceptions will automatically expire with the next edition, which means components and subassemblies that comply with IEC 60065 and IEC 60950-1 will no longer be accepted.

## KEEPING AHEAD OF THE IEC 62368-1 WAVE

IEC 62368-1 is transforming the safety evaluation of products – from design stage to final testing and certification. To reduce risks in the supply chain, procurement and product managers should work with an independent certification body. The right partner can check off each aspect along the line, ensuring that every component is compliant and that the final product is ready for the market or markets in which it will be sold.

TÜV Rheinland has been involved in the development of standards from the beginning. This enables us to help manufacturers throughout the process – especially during the transition period – by offering IECEE CB Scheme test reports for both the new IEC 62368-1 3rd edition standard and legacy standards.

## ABOUT TÜV RHEINLAND

A global leader in testing, inspection and certification services, TÜV Rheinland is able to provide customers with exceptional services and global market access. Through an extensive global networking, flexible scheduling, rapid turnaround times and a comprehensive portfolio of services, TÜV Rheinland offers the most cost-effective and time-efficient certification services, providing organizations with immediate competitive advantages, both domestically and globally.

## Technical changes to IEC 62368-1 3rd edition.

**Note:** All comparisons highlighted below are derived from the official documents of IEC 62368-1 (2nd edition) and IEC 62368-1 (3rd edition).

1. (4.4.3.7, T.9) Addition of a new requirement for **glass fixation tests for laminated glass as a safeguard** to prevent access to class 3 energy sources other than PS3.
2. (4.8.3. 4.8.5) Addition of **test conditions for battery compartments that are opened by using a tool in 4.8.3** and correction of the **compliance criteria in 4.8.5 to correspond to Figure V.1, not Figure V.2.**
3. (4.10.2) Addition of a new paragraph: **switches and relays located in a PS3** circuit or used as a safeguard shall comply with Clause G.1 or Clause G.2, respectively.
4. (5.2.2.5) **Deletion of the previous Table 8** for Electrical energy source limits for repetitive pulses, and **replacement with 5.2.2.2 (Table 4) and 5.2.2.4 (Tables 6 and 7).**
5. (5.3.1) Addition that **ES2 or ES3 circuits, from which accessible ES1 or ES2 circuits are derived shall be separated from ES3 mains**, and that for touch currents or prospective touch voltages to not exceed the limits under single fault conditions, insulated (secondary) circuits shall be used.
6. (5.4.2.3.2.3) Addition of a sentence that if DC mains supply is not located within the same building, **the mains transient voltage shall be declared in the installation instructions** by the manufacturer.
7. (5.4.4.9) Modification of the alternative test method to determine the suitability of **solid insulation materials at frequencies higher than 30 kHz** by calculation **using the parameter of determining  $V_{PW}$  and  $K_R$ .**
8. (5.4.9.2) Addition of **IEC 62911 in the note about routine testing** of the equipment.
9. (5.6.2.1) Additions to the description of **protective conductors with regard to the installation method.**
10. (5.6.4.1, 5.6.4.3, 5.6.5.1) Deletion of **"the requirement of 5.6.6" in the 2nd and 3rd dash of 5.6.4.1 and 5.6.5.1.** The compliance check for the terminal sizes for protective conductors is conducted **according to 5.6.4.3 and 5.6.5.1.**
11. (5.6.4.2.1) Expansion of Note 4 of **pluggable equipment type A in France**, where in certain cases the protective current rating of the circuit supplied from **the mains is taken as 20 A instead of 16 A.**
12. (5.6.8) Addition of new requirements for functional earthing: e.g. appliance inlets shall **comply with the creepage distance and clearance requirements for double or reinforced insulation.**
13. (5.7.4) Addition of additional test method for **unearthed accessible parts** regarding touch current or touch voltage.
14. (5.7.6) Modification of the requirements when **touch current exceeds ES2 limit** as follows:
  - The value of current shall be indicated **in the installation instructions** if it **exceeds 10mA**, and;
  - **Measuring test method** specified in clause 8 of IEC 60990:2016 **by inserting an ammeter of negligible impedance (for example, 0,5 Ω) in series with the protective conductor.**
15. (5.8) Addition of new requirements for **backfeed safeguards** in battery backed up supplies.
16. (6.3.1, 6.4.5.2, 6.4.6, 6.4.7.2) Addition that the requirements for combustible materials do not apply to parts with a mass of **less than 4g** or **a volume not exceeding 1750mm<sup>3</sup>** (without considering distance from PIS)

17. (6.3.1, 6.4.6) Addition that combustible materials can be tested by a **Glow-Wire test at 550°C** (same as IEC 60950-1).
- **6.3.1** (Basic safeguards under normal and abnormal operating conditions): combustible materials for components and other parts (including electrical enclosures, mechanical enclosures and decorative parts) not inside a fire enclosure shall comply with the Glow-Wire Test.
  - **6.4.6** (Control of fire spread in a PS3 circuit): Special requirements for combustible materials within the fire enclosure around tubing for air or fluid systems, containers for powders or liquids and foamed plastic parts.
18. (6.4.8.3.1, 6.4.8.3.3, 6.4.8.3.4) Addition of the **new Figure 40** for the determination of top, bottom and side openings, according to which an **angle of more than 5 degrees on the side** can be considered as a top or bottom opening. Deletion of **NOTES 6.4.8.3.3 and 6.4.8.3.4**. "NOTE Any openings within the zone as shown in Figure 41 (Figure 42) are regarded to be top openings (bottom openings), including side openings."
19. (6.4.8.3.3, 6.4.8.3.4) Addition of the fact that the description of **top and bottom opening properties** shall apply to openings **located in PS3 circuit**.
20. (6.4.8.3.4) Modification of the bottom opening and bottom properties as specified below.
- a. **Deletion of item c)** for mesh openings and item d) for other shaped openings in Table 34 & Table 35.
  - b. **Addition of Figure 43** for a baffle plate construction. (Same as IEC 60950-1)
  - c. **Addition** of an additional element for **instructional safeguards for use in fixed installations**.
21. (6.4.8.3.5) Addition to **side openings and side opening properties**: Major projections from the PIS pointing down to a 5 degrees angle **can be regarded as bottom openings**. The maximum projection distance does not **exceed the horizontal distance of 15mm**.
22. (6.4.7.2, 6.4.8.3.1, 6.4.8.3.2) Deletion of **the illustration of old version Figure 39** for "caused by **forced air flow**".
23. (6.4.8.3.3) Deletion of the description of the original **test method in the paragraph about top openings**, and direct reference to the requirements of S.2, which are in accordance with IEC 60695-11-5 specifications.
24. (6.5.3) Addition of new requirements for wire size dimensions of **internal wiring for socket-outlets according to Table G.7**.
25. (8.5.1) **For moving MS2 or MS3 parts** required to be accessible for the function of the equipment to an ordinary or instructed person, the following changes apply.
- **MS2 part** accessible to an ordinary person: Addition that an **instructional safeguard** shall be provided
  - **MS3 part** accessible to an ordinary or instructed person: Addition that an instructional safeguard shall be provided, and that a **manually activated stopping device** is required
26. (8.6.1) **Addition that the glass slide test is not applicable to floor standing equipment**, even though the equipment might have controls or a display.
27. (8.6.2.2) Modifications to the test method for the static stability test: Tilt of 10° remains unchanged. Change from **20% of the weight but limited to 250N** in any direction except upwards to: The equipment is subjected to a force equal to **50% of the weight of the unit vertical downwards, but not more than 100N**; and to **13% of the weight in all horizontal directions, but not more than 100N**. The equipment is placed at an angle of **10° from the horizontal and slowly rotated through an angle of 360°** about its normal vertical axis.
28. (8.6.5) Modification of the test method for the horizontal force test from **13% or 100N to 20% or 250N**, whichever is less.
29. (8.7.2) Modification of the test method for equipment mounted to a wall, ceiling or other structure; the **screw test shall be performed three times** according to Table 37.
30. (9.3, 9.4) Modification of the ambient temperature from 20 ~ 25°C to 20 ~ 30°C for the temperature test and in Table 38. The paragraph about accessible parts that require heat for the intended function moved to 9.4 (originally in 9.3 for safeguards against thermal energy sources); and addition of more stringent restrictions for wearable devices.
31. (9.4) Removal of the **protection against TS3** for an ordinary or an instructed person, requiring it only for a **skilled person**.
32. (9.6) Addition of new requirements and tests for **wireless power transmitters**.
33. (10.2.1 ~ 10.4.4) Modification of **radiation energy source classifications for lamps safeguards and laser safeguards**.



34. (10.6.1) Addition of requirements for personal music players as specified below.
- **Listening devices sold separately** shall comply with the requirements of 10.6.6
  - For listening devices clearly designed or intended primarily **for use by children**, the limits of the relevant toy standards may apply, such as **EN 71-1: 2011 in Europe**
  - **An alternative sound pressure in 10.6.3** may be used
35. (10.6.2.1, 10.6.2.2) Increase of the **RS1 or RS2 limits for the digital signal source**.
36. (10.6.3) Increase of the alternative requirement for the **maximum dose exposure**. **The test is performed according to EN 50332-3** "Measurement method for sound dose management".
37. (10.6.5) Modification of the procedure for preventing the exposure of **an ordinary person to an RS2 source** by mandating the provision of **instructional safeguards** and compliance with the related requirements.
38. (B.2.3) Deletion of the text description with the sentence "**the most unfavorable supply voltage required on subclause**".
39. (B.4.8) Addition of the criteria under which a PCB forming an open circuit of conductors can be regarded as a safeguard after single fault conditions.
40. (F.2.2) Addition of the words "**for safety purpose**" in the sentence of **graphical symbols**. The symbols shall be in accordance with IEC 60417, ISO 3864-2, ISO 7000 or ISO 7010, if available.
41. (F.3.5.3) Addition of the sentence "**after operation of the fuse, parts of the equipment that remain energized are at ES3 levels during servicing**" for the fuse in the neutral of the mains. In addition, instructional safeguards shall be provided.
42. (F.3.8) Modification to explain that a polarity marking is not required if **the pin configuration prevents reversed polarity**.
43. (G.3.4) Addition that **a protective device** shall feature an adequate **breaking capacity (rupturing)** to interrupt the maximum fault current (including short-circuit current) that can flow.
44. (G.8.2.1) The following additions and modifications:
- Additional overload requirements for **fire safeguards for varistors used in controlling the spread of fire**
  - **Deletion of a 10A fuse limit for a short circuit** when the method "reduce the likelihood of ignition" is chosen
  - **Change of "clamping voltage" to "nominal varistor voltage"**
45. (G.8.2.3) Modification of the test method so that **the overload test method for varistors between the mains conductors and the earth is conducted** according to 8.3.8.1 and 8.3.8.2 of IEC 61643-11.
46. (G.9) Modification of the test method for **integrated circuit (IC) current limiters** to the procedure outlined in the **new Table G.10**.
47. (G.10.6, 5.5.6) Modification of the test method for **bleeding resistors** to the procedure in 14.2 b) of the IEC 60065 specification.
48. (Previous G.11.4) **Deletion** of the previous paragraph in **G.11.4** and the application example of X/Y capacitors in **previous Tables G.12 to G.15**.
49. (G.16) Modification of the test method for **IC, including the capacitor discharge function (ICX)** as follows:
- **Impulse tests**: Using a capacitor with the **smallest capacitance and a resistor with the smallest resistance**
  - **On/off recycling tests**: Using a capacitor with the **largest capacitance and a resistor with the smallest resistance**. The connection and disconnection cycle time shall **not be less than 2s**
  - Change the application of an **AC mains voltage from 110% of rated voltage to 120%** for 2.5 min
50. (K.7.1) Addition of more description on the **separation distances for basic and reinforced insulation** for the contact gap **between contacts in the off position**. Example: For isolation of class 3 energy sources, which do not pose a threat to life safety, basic insulation should be sufficient.
51. (M.4.3) Fire enclosure of secondary lithium batteries: Deletion of clause 6.4.5.2 and replacement with the following content.
- "Equipment with batteries are exempt from the above requirement, if the equipment uses a cell that complies with PS1"
52. (Annex S, 6.4.8.3.3) Move of the needle flame test of top openings into the description of chapter S.2, slight modification to it and addition of the **new Figure S.1** to facilitate understanding.
53. (Annex X, 5.4.2.1) For overvoltage category II: Addition of an **alternative method of determining clearances** for the insulation in circuits connected to an A.C. mains not exceeding 420 V peak (300 V RMS), as specified in Annex X, which corresponds to IEC 60950-1 and IEC 60065.

54. (5.0 of IEC 62368-3, 6.2 or Q.1 of IEC 62368-1) Increase of the requirements of the new IEC 62368-3 standard for DC power transfer through communication cables and ports, such as USB or PoE.

55. Other than mentioned above, please refer to the latest standard specified, such as:

- (4.1.4, 5.3.2.1, 5.4.2.3.2.1, 5.4.2.3.2.3, 5.5.9, F.4, Annex C, Annex Y) Outside equipment
- (4.1.8, 4.4.4, 5.4.12, 6.4.9, F.4, G.15) Insulating liquids
- (8.5.4) Work cells mean areas containing hazardous moving parts, into which people may enter or insert a complete limb or head in order to service or operate the equipment
- (8.11.2, 8.11.3.1, 8.11.3.3) Slide-rail mounted equipment (SRME) for requirements, downward test and integrity of slide rail end stops
- (G.5.3.4) Transformers using fully insulated winding wire (FIW)
- (M.7) Lead-acid and nickel-cadmium may explode due to ventilation

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