Keeping Up With IEC 62368

by Kevin Parmenter, Chair, and James Spangler, Co-chair, PSMA Safety and Compliance Committee

The UL/EN/IEC 62368 standard is a merger of two standards—UL/EN/IEC 60065 Audio and Video Equipment and UL/EN/IEC 60950 Information and Communication Equipment. As with other standards, there are different versions or editions of the standard such as IEC 62368-1 2014. As this standard applies to a broad range of popular applications, many designers are affected by its requirements.

Most designers probably have some familiarity with 62368 because the industry has been transitioning to this standard for several years, and within the U.S. this standard replaced the legacy standards in June 2019 for any new products seeking certification. However, there's another regulatory milestone looming as the legacy standards in the European Union are about to be withdrawn on December 20, 2020, making this essentially the adoption date for 62368 in the EU.[1]

As this deadline approaches, many designers may still need to come up to speed on what the standard requires, and understand what variations of the standard are being applied as well as aspects of the standard that are still in flux. With that in mind, we present a brief overview and update on UL/EN/IEC 62368, noting the status of various versions of the standard in different countries and sources for further information. We also highlight a few elements of IEC 62368 such as standards-related terminology, touch temperature limits and two application areas that will be impacted by anticipated changes in IEC 62368, namely indoor and outdoor equipment and products with USB and PoE interfaces.

Safety And Hazard Based

IEC 62368 is not a rule-based standard but rather a safety and hazard-based standard. Audio and video equipment and information communications equipment have many ports such as USB and the newer USB Type C ports. The computer monitor has ports that the consumer or user can touch. The manufacturers are now requested to present hazards to the safety agencies including voltage, and temperatures of the various surfaces.

It has taken time for the various agencies to create a harmonized standard. Each region of the world has its own version and implementation date as seen in Table 1.

Table 1. IEC 62368 implementation by country or region.[2]

Country	Standard	IEC Equivalent	Implementation	Notes
Australia	AS/NZS 62368.1	IEC 62368-1:2014	2/15/2022	AS/NZS National Differences incorporated
China	GBxxx	IEC 62368-1:2018	N/A	It is expected China will publish GB national standard based on 3rd. Ed. of IEC 62368-1. Date unknown.
European Union	EN 62368-1:2014	IEC 62368-1:2014	12/20/2020	EN 62368-1:2014 or EN 60065 / EN 60950-1 currently allowed for presumption of conformity. EN 62368-1:2020 (3rd edition) expected March 6th BUT no inclusion into OJEU
Japan	J 62368-1	IEC 62368-1:2014	7/20/2018	Japanese National Differences incorporated
Korea	KS C IEC 62368-1	IEC 62368-1:2014	N/A	Not adopted so far. Date unknown.
Mexico	NMX-I-62368-1-NYCE-2015	IEC 62368-1:2014	Voluntary - TBD	Study continues towards utilizing NOM standard for mandatory approval
South Africa	SANS 62368-1:2011 (Ed. 1.00)	IEC 62368-1:2010	Voluntary - TBD	In process of issuing Ed. 2 (TBD). 62368-1 not really accepted stand-alone – additional compliance declarations required
Taiwan	CNS 15598-1 (2012)	IEC 62368-1: 2010	2020	62368-1 not accepted so far. New CNS 15598-1 standard being prepared based on IEC 62368-1:2018 (3rd ed)

UL has given a number of presentations and overviews concerning the standard. One of the earlier presentations was an IEC 62368-1 overview given by Thomas Burke a principal product safety engineer, Consumer and Enterprise Tech Equipment at UL, on June 7, 2017 to the Power Sources Manufacturers Association (PSMA).[2] The PSMA has a recording of the presentation along with the slides for those to sign up at no charge.

More recently Dennis Butcher, senior project engineer, Ctech EULA, gave a webinar presentation on July 28, 2020 on an Update to IEC/EN 62368-3.[3] This presentation is available from UL's Toolkit page.[4] This web page offers resources to help engineers and compliance engineers navigate the IEC 62368-1: 3rd Edition from UL 60065 and the UL 60950 standards.

There are a number of editions to IEC 62368-1 including 62368-1 2nd ed. -2014, which is often cited in the literature. There's also UL/CSA 62368-1:3rd ed. which was published Oct. 4, 2018. This paper cannot address many of the differences found in the variations because these variations apply to different products and each product is different and has different uses.

Testing And Design Assistance

Many companies have a compliance engineering department. This department gathers the standards for the products for safety and regulations for various parts of the world where the company's products are sold. The compliance department needs to have a good understanding of the language used in the standards because in many cases, this language may not be understood by design engineers. The following was taken from the Thomas Burke presentation defining some differences.

Table 2. Definitions used by IEC 60950-1 verse IEC 62368-1.[2]

Clause 3 – Terms, Definitions & Abbreviations: Differences

IEC 60950-1	IEC 62368-1
User (Operator)	Ordinary Person
(Operator w/ limited training, e.g., allowed access to RAL)	Instructed Person
Service Person	Skilled Person
SELV (voltage based) **LCC** (current based)	**ES1** (considers both voltage & current)
TNV e.g., TNV-1	**External Circuit,** with transient considerations e.g., ES1 with Table 16, ID Nos. 4, 6,7 etc.
Marking Instruction	Instructional Safeguard

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Hazards

In products where consumers can touch various parts of the product, there are issues with both temperature and electric shock. Table 3 lists temperature limits under the standard for accessible (touchable) parts.

Table 3. Touch temperature limits imposed by IEC 62368-1.[2]

Clause 9 - Thermal-burn injury (cont.)

9.2.6 Touch temperature levels

Table 38 – Touch temperature limits for accessible parts

	Accessible parts [a]	Maximum temperature (T_{max}) °C			
		Metal [f]	Glass, porcelain and vitreous material	Plastic and rubber	Wood
TS1	Handles, knobs, grips, etc., and external surfaces either held, touched or worn against the body in normal use (> 1 min) [b, c]	48	48	48	48
	Handles, knobs, grips, etc., and external surfaces held for short periods of time or touched occasionally (> 10 s and < 1 min) [c]	51	56	60	60
	Handle, knobs, grips etc., and external surfaces touched occasionally for very short periods (>1 s and < 10 s) [c]	60	71	77	107
	External surfaces that need not be touched to operate the equipment (<1 s) [c]	70 [d]	80 [d]	94 [d]	140
TS2	Handles, knobs, grips, etc., and external surfaces held in normal use (> 1 min) [c]	58	[illegible]	58	58
	Handles, knobs, grips, etc., and external surfaces held for short periods of time or touched occasionally (> 10 s and < 1 min) [c]	61	66	[illegible]	70
	Handle, knobs, grips etc., and external surfaces touched occasionally for very short periods (> 1 s and < 10 s) [d]	70	81	87	117
	External surfaces that need not be touched to operate the equipment (< 1 s) [d]	80 (100) [e]	90 (100) [e]	104	150
TS3	Higher than the TS2 limits				

Typically lower than allowed by 60950-1, but temps taken @ 25 C ambient, with no Tma (per IEC Guide 117 research basis) …

Typical metal encased SMPS …

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Indoor Outdoor Equipment

Because the 62368 standard did not address all industry concerns, there are cases where it has not supplanted the old standard. This is true for outdoor applications. As the following excerpt[3] explains, the second edition of 62368 still references IEC 60950-22 with regard to outdoor equipment. However, the third edition of the standard will include the 60950-22 requirements in an Annex Y as noted. Some of these requirements are still not fully defined. So some unsettled issues remain and other agencies will need to help address what is to be applied.

2nd to 3rd: Outdoor equipment considerations

IEC 60950-22 is used for Outdoor Equipment in 2nd ed.
- but is replaced by Annex Y in the 3rd ed.

- The requirements for Outdoor Equipment don't change but some additional requirements may apply e.g.
  - clause 5.4.5 applies to outdoor antenna connections (taken from 60065 – not a previous requirement in 60950-1)
  - the IP rating will have to be marked if the equipment is intended for other than IPX0.

USB And PoE

Another case where the legacy 60950 requirements have remained in effect are the interfaces that transmit both data and power. For example, many pieces of equipment use USB for both data and power. This is true for the newer USB Type C cables that can eliminate product power supplies and the associated ac power cords.

Similarly, many security cameras and monitors use CAT 5 and CAT 6 cables for both power and data information following the power over Ethernet (PoE) standards. Both of these interfaces will be covered in the third edition of IEC 62368-1 as shown in the following excerpt.[2]

Ed. No. 3 of IEC 62368-1: Anticipated Changes

- **IEC 60950-21** (RFT) requirements being incorporated into new ***IEC 62368-3, DC power transfer through communication cables or ports***, with expansion to cover both **RFT** & **USB/PoE/etc** interfaces…

There are newer lighting products that are using CAT 5 and CAT 6 cable systems for both hallway lighting in hotels and security cameras. Some of these systems have backup dc power in case of a power outage. These systems use the new LED lights, allowing lower power consumption and long periods of operation such as two or three hours, which was unheard of with emergency exit lighting and security cameras in the past.

These lighting products came onto the market after the 62368 was initially published so they weren't covered. And there are others too like video doorbells, which can use the existing power and can even have a battery backup using Li-ion batteries. But it's expected that these products will be covered in the third or fourth editions.

References

1. "Getting to Know IEC 62368-1—How Does A TV/Stereo Standard Affect My Industrial Power Electronics Design?" by Kevin Parmenter and James Spangler, How2Power Today, November 2017.

2. "IEC 62368-1 Overview" by Tom Burke, UL Presentation to PSMA Safety & Compliance Committee, 6/7/2017.

3. "IEC/UL/EN 62368-1 transition: -3rd ed. updates, -IEC/EN 62368-3"webinar by Dennis Butcher, July 2020, available via reference 4.

4. UL's ToolKit for Your 62368-1 Transition".

About the Authors

Kevin Parmenter is an IEEE Senior Member and has over 20 years of experience in the electronics and semiconductor industry. Kevin is currently director of Field Applications Engineering North America for Taiwan Semiconductor. Previously he was vice president of applications engineering in the U.S.A. for Excelsys, an Advanced Energy company; director of Advanced Technical Marketing for Digital Power Products at Exar; and led global product applications engineering and new product definition for Freescale Semiconductors AMPD - Analog, Mixed Signal and Power Division.

Prior to that, Kevin worked for Fairchild Semiconductor in the Americas as senior director of field applications engineering and held various technical and management positions with increasing responsibility at ON Semiconductor and in the Motorola Semiconductor Products Sector. Kevin also led an applications engineering team for the start-up Primarion.

Kevin serves on the board of directors of the PSMA (Power Sources Manufacturers Association) and was the general chair of APEC 2009 (the IEEE Applied Power Electronics Conference.) Kevin has also had design engineering experience in the medical electronics and military electronics fields. He holds a BSEE and BS in Business Administration, is a member of the IEEE, and holds an Amateur Extra class FCC license (call sign KG5Q) as well as an FCC Commercial Radiotelephone License.

Jim Spangler is a Life Member of the IEEE with over 40 years of electronics design experience and is president of Spangler Prototype Inc. (SPI). His power electronics engineering consulting firm's priority is helping companies to place products into production, assisting them to pass government regulations and agency standards such as UL, FCC, ANSI, IES, and the IEC.

For many years, he worked as a field applications engineer (FAE) for Motorola Semiconductor, On Semiconductor, Cirrus Logic, and Active Semiconductor, assisting customers in using semiconductors. He published numerous application notes and conference papers at a variety of conferences: APEC, ECCE, IAS, and PCIM. Topics included power factor correction, lighting, and automotive applications. As a FAE, he traveled internationally giving switch-mode power supply seminars in Australia, Hong Kong, Taiwan, Korea, Japan, Mexico, and Canada.

Jim has a master's degree from Northern Illinois University (NIU) and was a PhD candidate at Illinois Institute of Technology (IIT). He taught senior and first-level graduate student classes: Survey of Power Electronics, Fields and Waves, and Electronic Engineering at IIT and Midwest College of Engineering. Jim is a member of the IEEE: IAS, PELS, PES; the Illuminating Engineering Society (IES), and the Power Sources Manufacturers Association (PSMA) where he is co-chair of the Safety and Compliance Committee.

For further reading on power supply-related safety and compliance issues, see How2Power's special section on Power Supply Safety and Compliance.