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OVERVIEW &

GAP ANALYSIS OF HAZARD BASED SAFETY ENGINEERING (HBSE)

IEC/UL/CSA 60950-1 AND 62368-1 STANDARDS

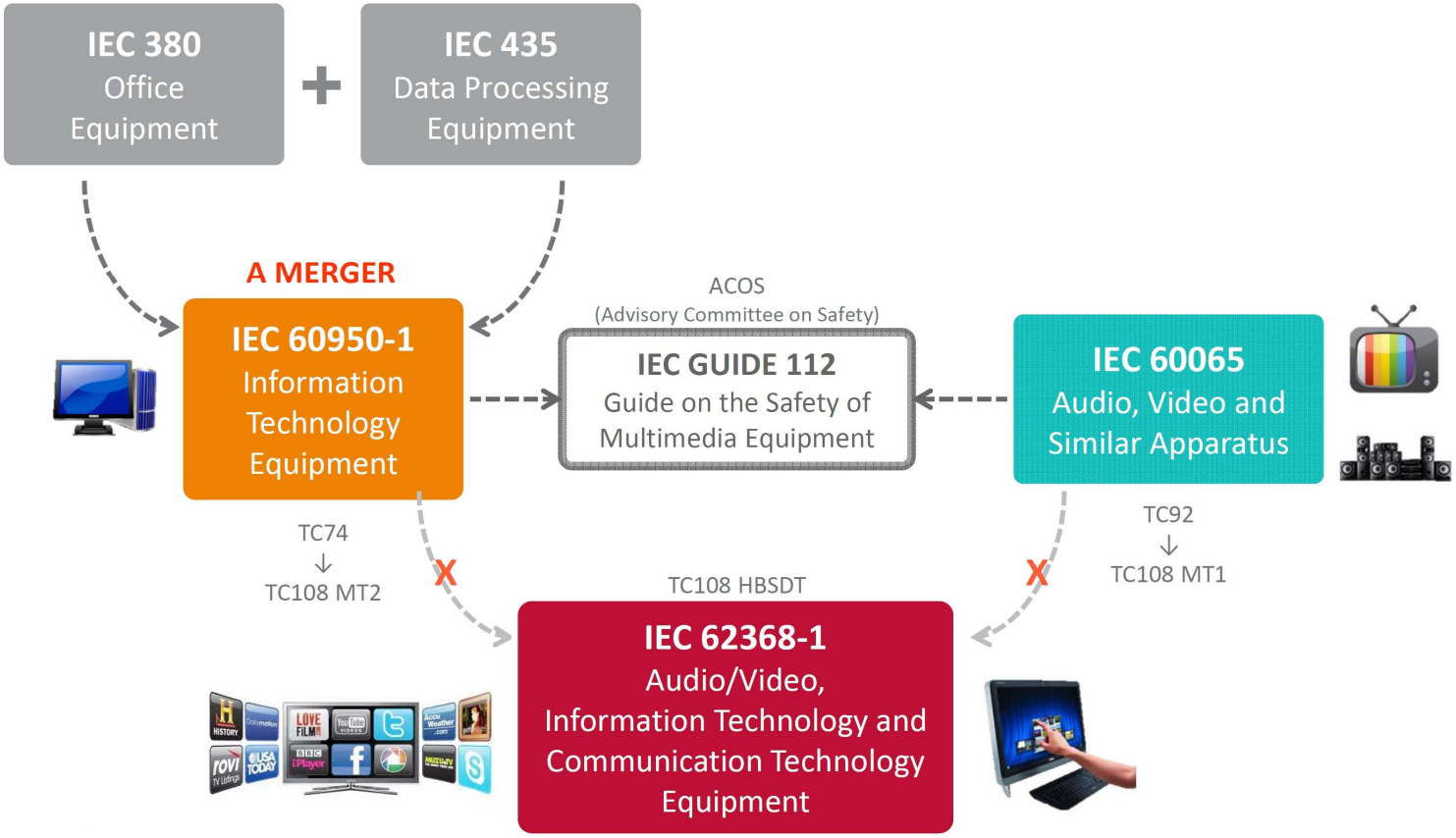
Presented By: Henriette Bullmer, Director – Western Region

April 15, 2019

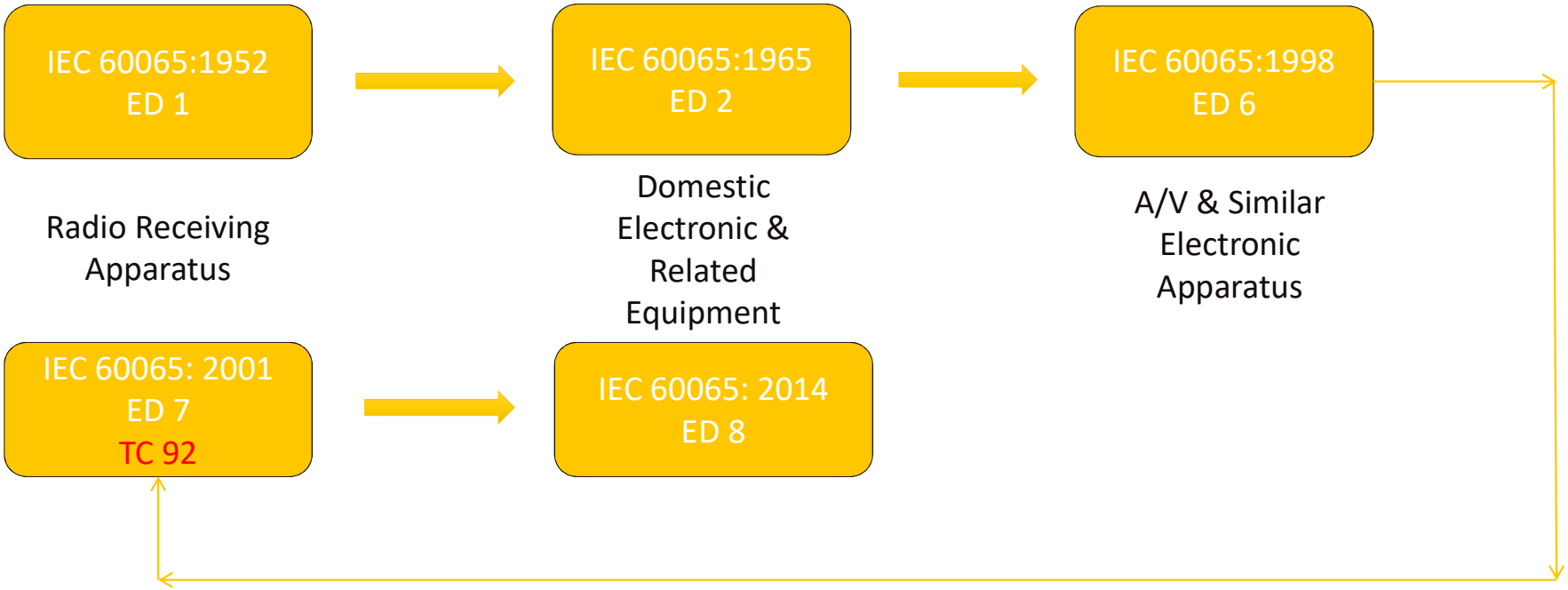
AGENDA

- History
- Introduction of 62368-1 Standard
- Overview & Gap Analysis of Standards 60950-1 and 62368-1
- Transition Updates
- Summary

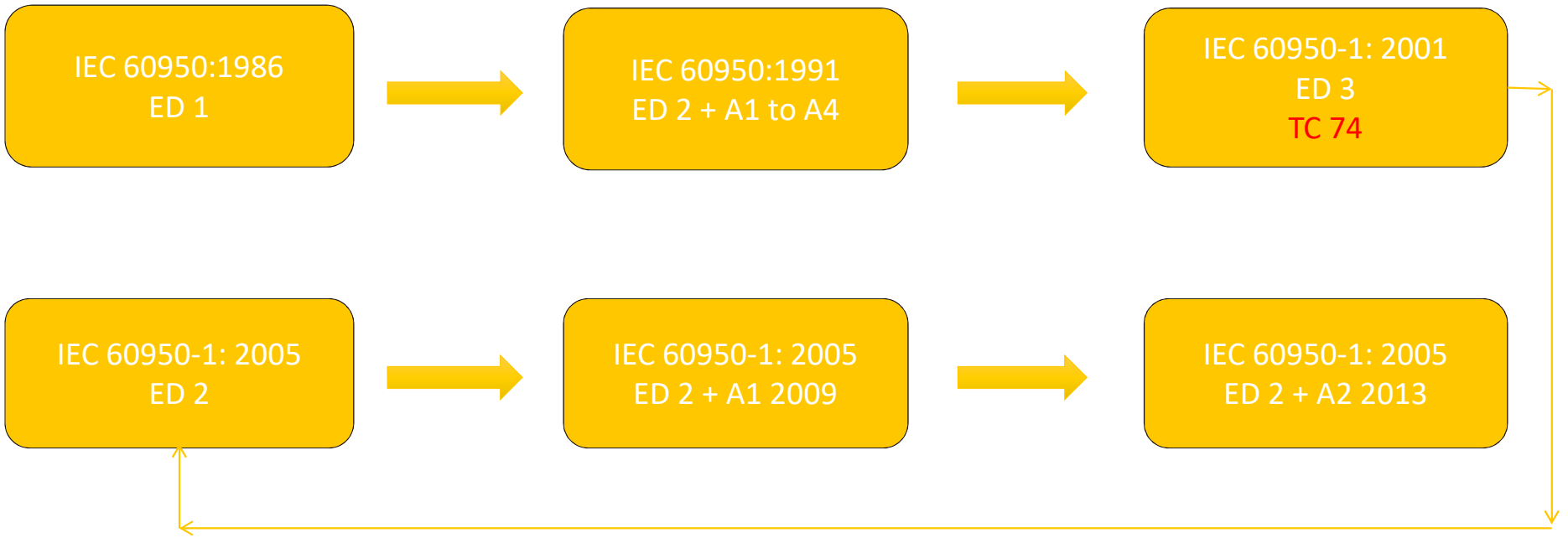
HISTORY


IEC 380
Office Equipment
+
IEC 435
Data Processing Equipment
A MERGER
IEC 60950-1
Information Technology Equipment
ACOS
(Advisory Committee on Safety)
IEC GUIDE 112
Guide on the Safety of Multimedia Equipment
IEC 60065
Audio, Video and Similar Apparatus
TC74
↓
TC108 MT2
X
TC108 HBSDT
IEC 62368-1
Audio/Video, Information Technology and Communication Technology Equipment
X
TC92
↓
TC108 MT1

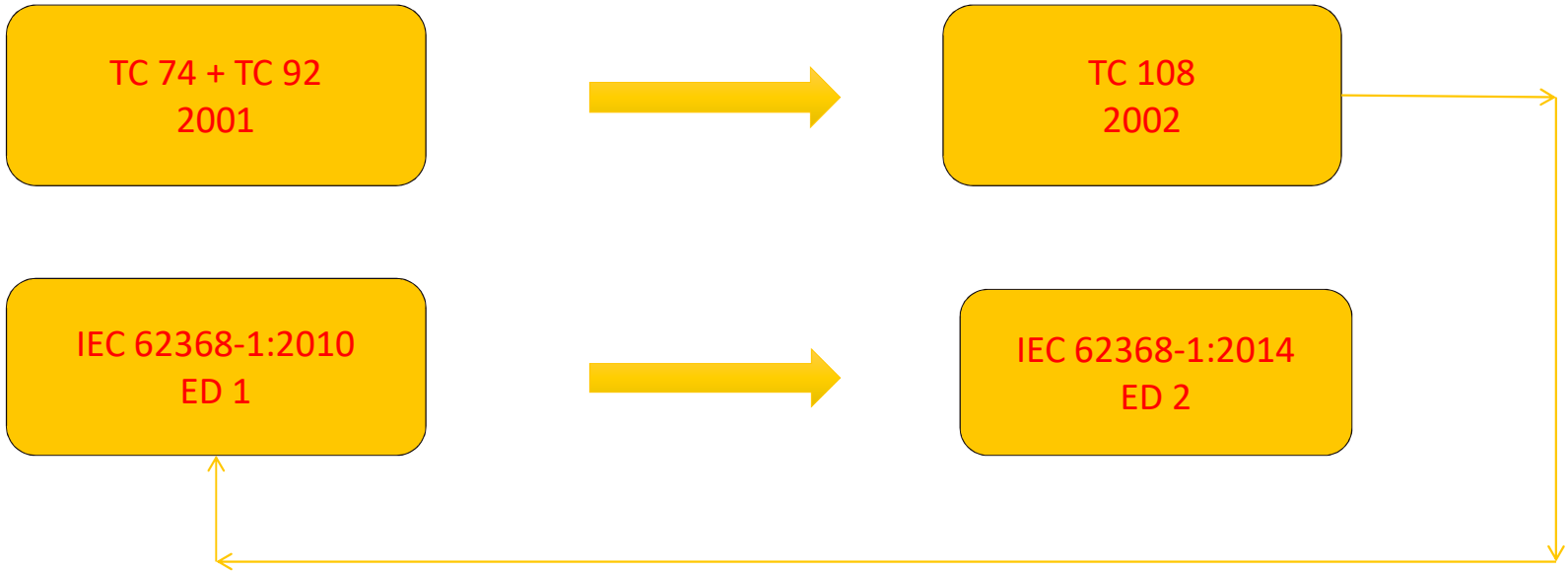
HISTORY (IEC 60065)



HISTORY (IEC 60950-1)



HISTORY (IEC 62368-1)



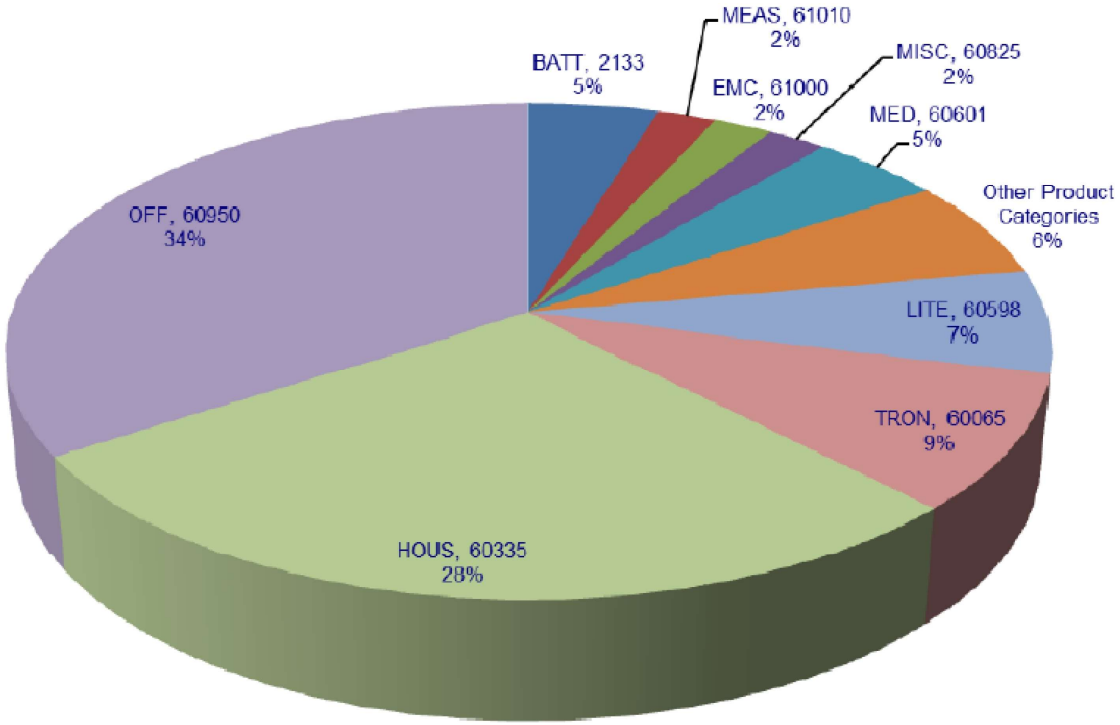
HISTORY

IECEE CB Scheme: 2013 - 2016

OFF & TRON 43% CB Scheme!

41k+ certificates…

Top 10 Product Categories in the last 4 years (2013, 2014, 2015 and 2016)



HISTORY

Formal TC108 effort on IEC 62368-1 began in year 2002

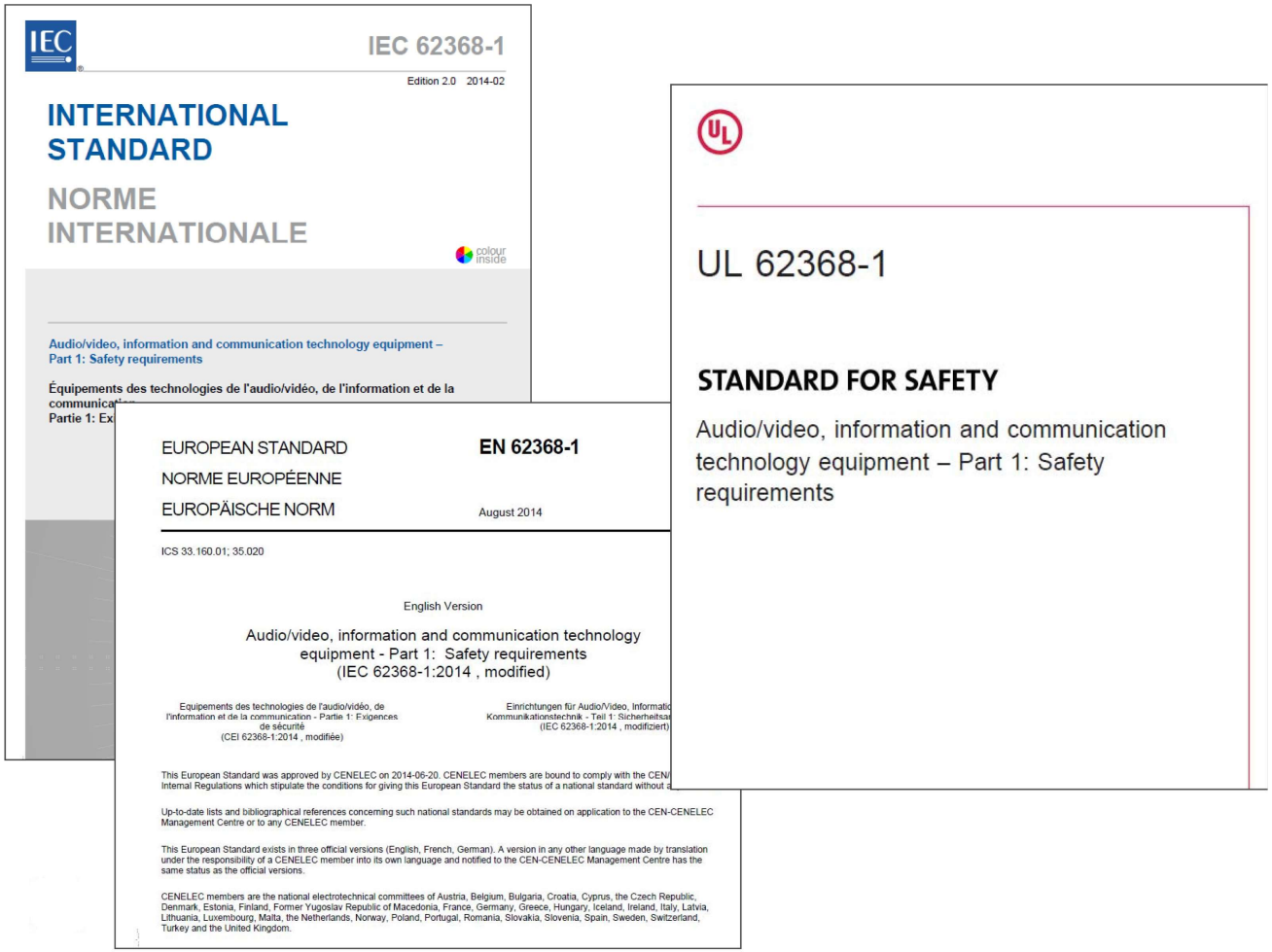
Edition 1:

- IEC 62368-1, Ed. 1: January 2010
- EU: Ed. 1 not adopted
- CAN/US: CSA/UL 62368-1, Ed. 1: February 2012

Edition 2:

- IEC 62368-1, Ed. 2: February 2014
- EU: EN 62368-1, Ed. 2: August 2014
- CAN/US: CSA/UL 62368-1, Ed. 2: December 2014

HISTORY


IEC
IEC 62368-1
Edition 2.0 2014-02
INTERNATIONAL STANDARD
NORME INTERNATIONALE
colour inside
Audio/video, information and communication technology equipment – Part 1: Safety requirements
Équipements des technologies de l'audio/vidéo, de l'information et de la
Partie 1: Ex
EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM
EN 62368-1
August 2014
ICS 33.160.01; 35.020
English Version
Audio/video, information and communication technology equipment - Part 1: Safety requirements
(IEC 62368-1:2014 , modified)
Equipements des technologies de l'audio/vidéo, de l'information et de la communication - Partie 1: Exigences de sécurité
(CEI 62368-1:2014 , modifiée)
Einrichtungen für Audio/Video, Informatic
Kommunikationstechnik - Teil 1: Sicherheitsa
(IEC 62368-1:2014 , modifiziert)
This European Standard was approved by CENELEC on 2014-06-20. CENELEC members are bound to comply with the CEN/
Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without a
Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.
This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.
CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.
UL
UL 62368-1
STANDARD FOR SAFETY
Audio/video, information and communication technology equipment – Part 1: Safety requirements

HISTORY

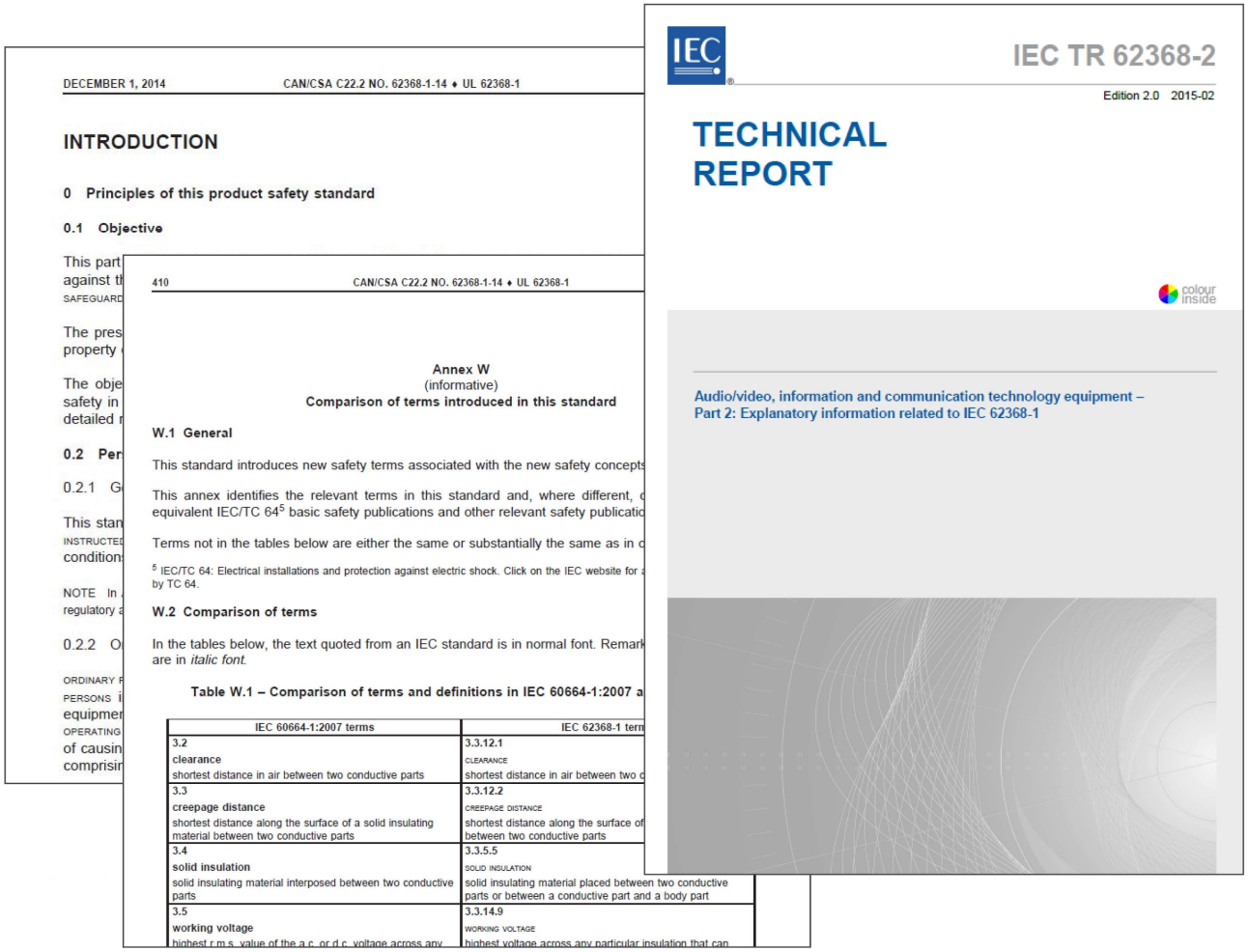
Essential Reference Documents:

1. IEC Technical Report (TR) 62368-2, Audio/Video, Information and Communication Technology Equipment – Part 2: Explanatory information related to IEC 62368-1

- Provides for individual clauses/sub-clauses,
  - Source,
  - Purpose &
  - Rationale
- Essential since 62368-2 documents the TC decisions and allows future users of the standard to know the sources and background behind published content

5.4.9	**Electric strength test**
Source:	IEC 60664-1: 2007
Purpose:	To test the insulation to avoid breakdown.
Rationale:	Values of test voltages are derived from Table F.5 of IEC 60664-1, however the test duration is 60 s. This method has been successfully used for products in the scope of IEC 60065 and IEC 60950-1 for many years. The d.c. voltage test with a test voltage equal to the peak value of the a.c. voltage is not fully equivalent to the a.c. voltage test due to the different withstand characteristics of solid insulation for these types of voltages. However in case of a pure d.c. voltage stress, the d.c. voltage test is appropriate. To address this situation the d.c. test is made with both polarities.

HISTORY



DECEMBER 1, 2014 CAN/CSA C22.2 NO. 62368-1-14 • UL 62368-1

INTRODUCTION

0 Principles of this product safety standard

0.1 Objective

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410 CAN/CSA C22.2 NO. 62368-1-14 • UL 62368-1

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

W.1 General

This standard introduces new safety terms associated with the new safety concepts

This annex identifies the relevant terms in this standard and, where different, c
equivalent IEC/TC 64[5] basic safety publications and other relevant safety publicatio

Terms not in the tables below are either the same or substantially the same as in c

[5] IEC/TC 64: Electrical installations and protection against electric shock. Click on the IEC website for
by TC 64.

W.2 Comparison of terms

In the tables below, the text quoted from an IEC standard is in normal font. Remark
are in *italic font*.

Table W.1 – Comparison of terms and definitions in IEC 60664-1:2007 a

IEC 60664-1:2007 terms	IEC 62368-1 term
3.2 **clearance** shortest distance in air between two conductive parts	3.3.12.1 CLEARANCE shortest distance in air between two c
3.3 **creepage distance** shortest distance along the surface of a solid insulating material between two conductive parts	3.3.12.2 CREEPAGE DISTANCE shortest distance along the surface of between two conductive parts
3.4 **solid insulation** solid insulating material interposed between two conductive parts	3.3.5.5 SOLID INSULATION solid insulating material placed between two conductive parts or between a conductive part and a body part
3.5 **working voltage** highest r.m.s. value of the a.c. or d.c. voltage across any	3.3.14.9 WORKING VOLTAGE highest voltage across any particular insulation that can

IEC

IEC TR 62368-2

Edition 2.0 2015-02

TECHNICAL REPORT

colour inside

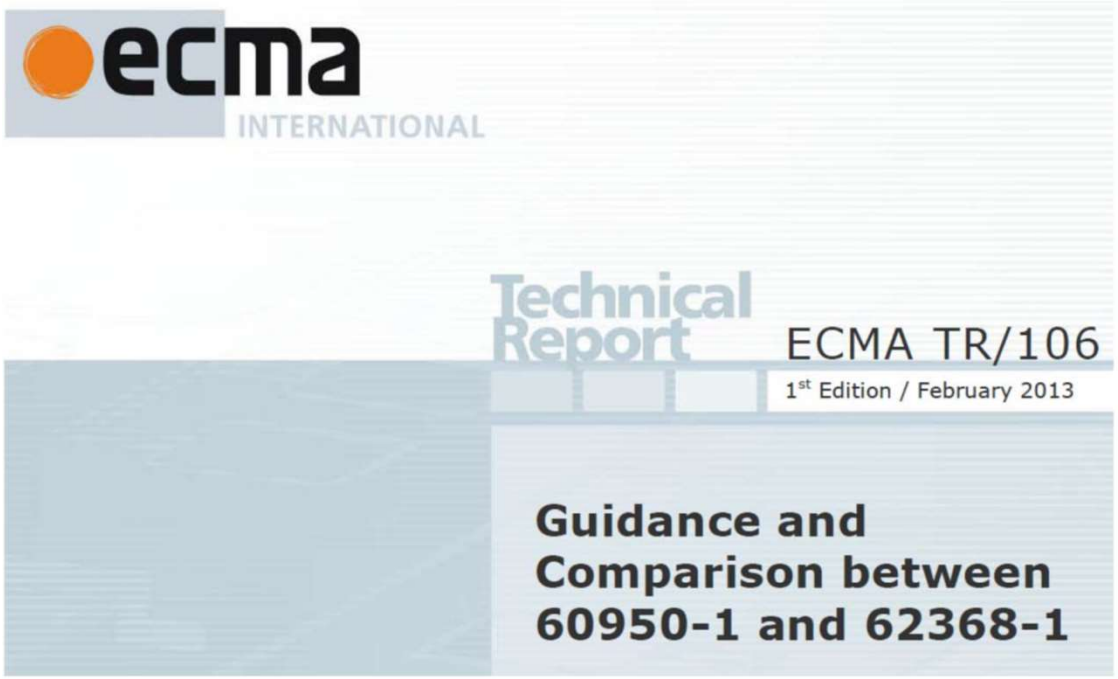
Audio/video, information and communication technology equipment –
Part 2: Explanatory information related to IEC 62368-1

HISTORY

Essential Reference Documents:

2. ECMA TR/106, Guidance and Comparison between 60950-1 & 62368-1

- http://www.ecma-international.org/publications/techreports/E-TR-106.htm



INTRODUCTION OF 62368-1 STANDARD

What is 62368-1 standard?

- A **hazard-based** standard
- A performance-oriented standard

- Covers scopes (but not a merger) of previous (legacy) standards:
  - **IEC 60065** – Audio, Video & Similar Electronic Apparatus – Safety Requirements
  - **IEC 60950-1** – Information Technology Equipment – Safety – Part 1: General Requirements

INTRODUCTION OF 62368-1 STANDARD

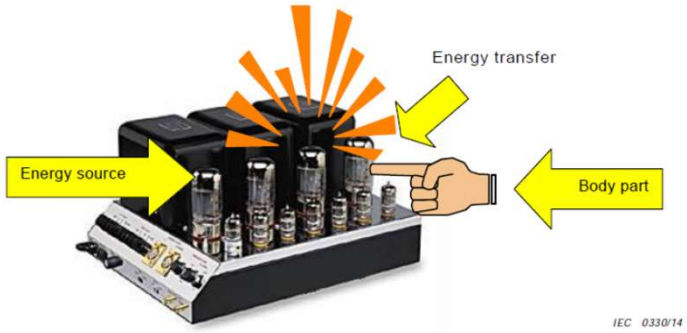
Why shifting from 60950-1 to 62368-1 standard?

- **Less distinction today**, in the recent past, and in the future among high-tech products:
  - **Similar technology**;
  - **Similar marketing** / distribution channels;
  - **Similar use environments**;
  - **Similar users**

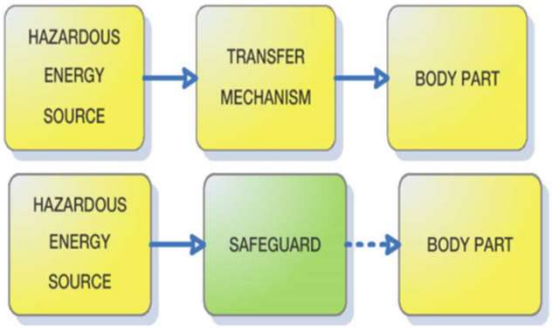
- Therefore, **need single safety standard** that:
  - **Applies to a broad range** of HT products;
  - Both is **technology independent** and allows for **introduction of new technology easier**;
  - Allows for **more design freedom**;
  - **Minimizes need for** national / regional **differences**;
  - **Preserves information** on the rationale for requirements;
  - **Stable, understandable & user friendly**; and
  - Ultimately leads to design and manufacture of safe products

INTRODUCTION OF 62368-1 STANDARD

Hazard-based Safety Engineering (HSBE)



- Key tool: **3 Block Model**

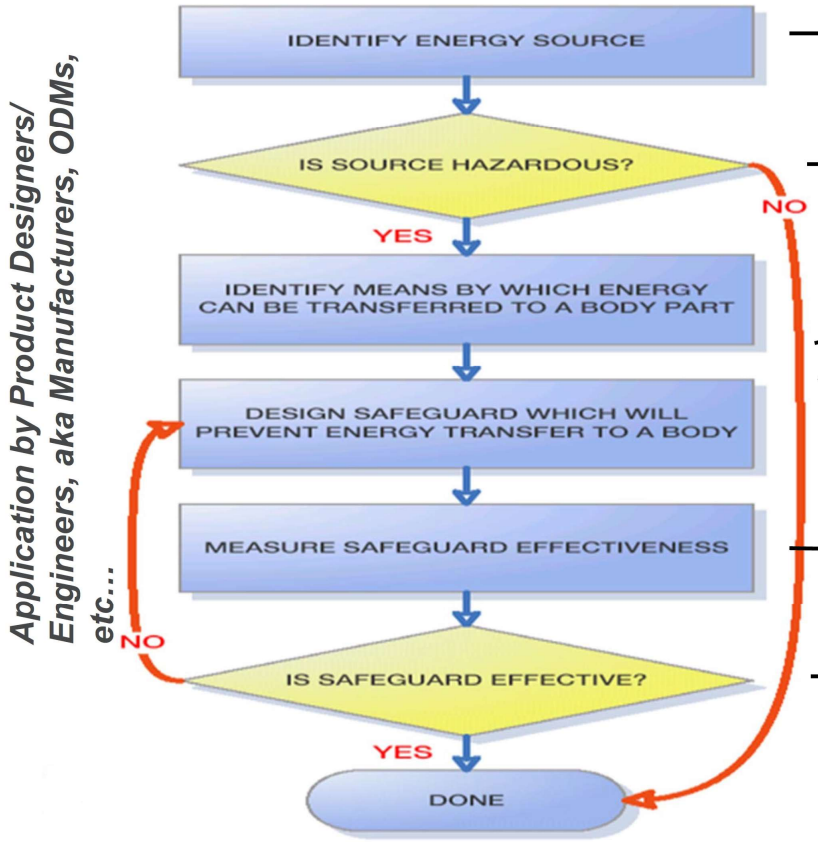


- **HSBE** typically consists of:
  a. **Identifying energy sources** in the product;
  b. **Classifying** the energy (e.g. Class 1) due to potential for causing injury or damage (harm);
  c. Identifying needed **safeguards** for protection from energy sources with the potential for causing injury or damage; and
  d. **Qualifying the safeguards** as effective

INTRODUCTION OF 62368-1 STANDARD

HSBE Application Process:

Application Practice** of **62368-1** during **3rd party certification…



Application by Product Designers/ Engineers, aka Manufacturers, ODMs, etc…

e.g., via initial review of product & schematics….

e.g., via measurements to determine energy levels, Class 1, 2 or 3...

e.g., via detailed product review and analysis of design, construction & circuits, including identification of safeguards, such as insulation & critical components…

e.g., via performance tests, or use of allowed prescribed constructions, including safety critical components…

e.g., via test compliance criteria, or confirmation of compliance w/requirements for prescribed constructions…

INTRODUCTION OF 62368-1 STANDARD

What is 62368-1 not?

- **Not** a risk-based standard
  - Risk analysis **not** required (i.e. IEC 60601-1, 3rd Ed.) during application & certification
  - Decision on application of requirements does **not** involve risk considerations
  - Some risk analysis was used by IEC TC108 at the technical committee level to develop the actual requirements (i.e. levels /limits associated with Class 1, 2 & 3)

- IEC 60065 (A/V & SEA) ≠ IEC 62368-1 (A/V ICT)
- IEC 60950-1 (ITE) ≠ IEC 62368-1 (A/V ICT)
- IEC 60065 + IEC 60950-1 ≠ IEC 62368-1

INTRODUCTION OF 62368-1 STANDARD

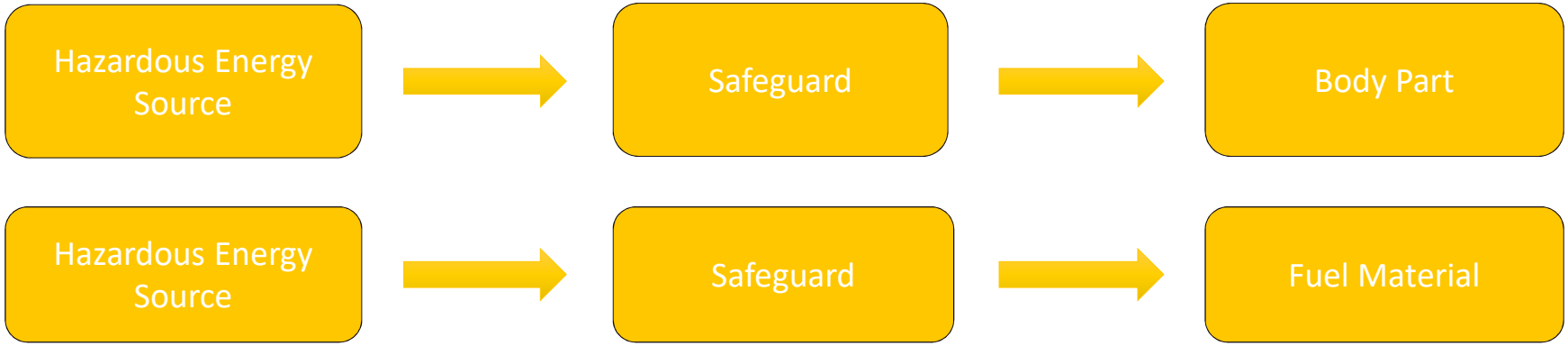
3 Block Harm & Property Damage Model:

- **Harm – Injury**

- **Electrical Fire – Property Damage**

INTRODUCTION OF 62368-1 STANDARD

3 Block Safety Model:



- **Objective**: Prevent Injury & Property Damage
- **Action**: Follow systematic process as called out in the standard

INTRODUCTION OF 62368-1 STANDARD

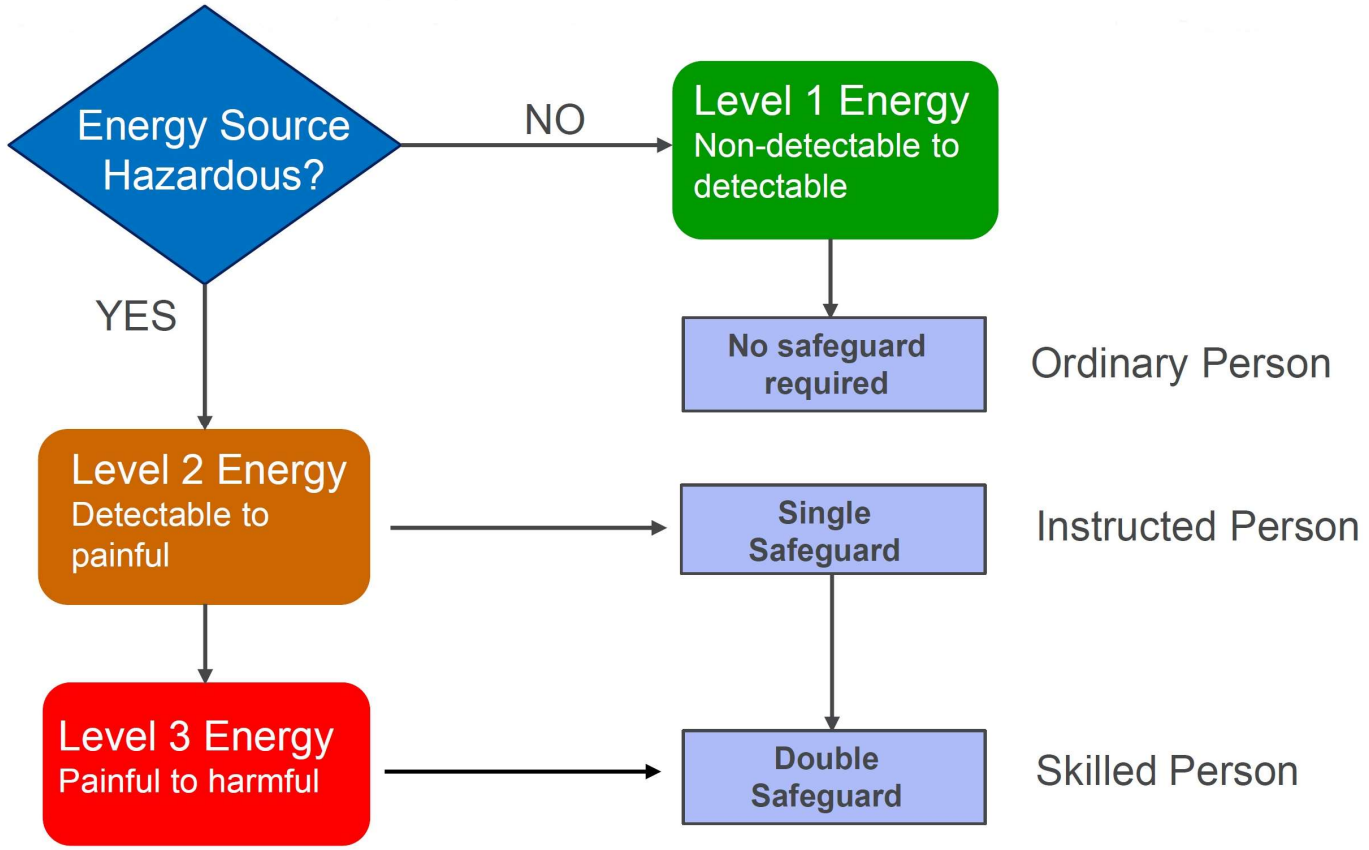
Classification of Energy Levels & Effects:

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

- **Objective**: Find the type and level of hazard
- **Action**: Follow systematic process as called out in the standard

INTRODUCTION OF 62368-1 STANDARD

IEC 62368-1 Required Safeguards:



INTRODUCTION OF 62368-1 STANDARD

Order of preference for providing safeguards:

3 Types of Safeguards

Objective: To prevent undesirable flow of energy under normal operating condition, abnormal operating condition and single fault condition

- **Equipment Safeguards**
  - Always useful, do not require any knowledge or actions by persons coming into contact with the equipment
- **Installation Safeguards**
  - Useful when a safety characteristic can only be provided after installation
  - i.e. the equipment is to be bolted to the floor to provide stability
- **Behavioral Safeguards**
  - Useful when the equipment requires an energy source to be accessible

Safeguard selection accounts for the **nature of the energy source**, the **intended user**, the **functional requirements of the equipment**, and similar considerations

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Structure of IEC 60950-1:

0 Principles

1 General, incl. Scope, Terms, Components, etc.

2 Protection from hazards

3 Wiring, connections and supply

4 Physical requirements

5 Electrical requirements and simulated abnormal conditions

6 Connection to telecommunication networks

7 Connection to cable distribution systems

Annexes (partial listing)

A – Tests for resistance to heat and fire

B – Motor tests

C – Transformers

D – Measuring instruments for touch-current

F – Measurement of clearances and creepage distances

G – Alternative method for determining minimum clearances

Q – Voltage dependent resistors

T – Guidance on protection against ingress of water

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Structure of IEC 62368-1:

0 Principles

1 Scope

2 Normative references

3 Terms, definitions and abbreviations

4 General requirements

5 Electrically-caused injury

6 Electrically-caused fire

7 Hazardous Substances

8 Mechanically-caused injury

9 Thermal-burn injury

10 Radiation

Annexes (partial listing)

A – Examples of equipment within scope

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

F – Equipment markings, instructions and instructional safeguards

G – Components

M – Batteries and fuel cells

Q – Interconnection with building wiring

T – Mechanical strength tests

V – Determination of accessible parts

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

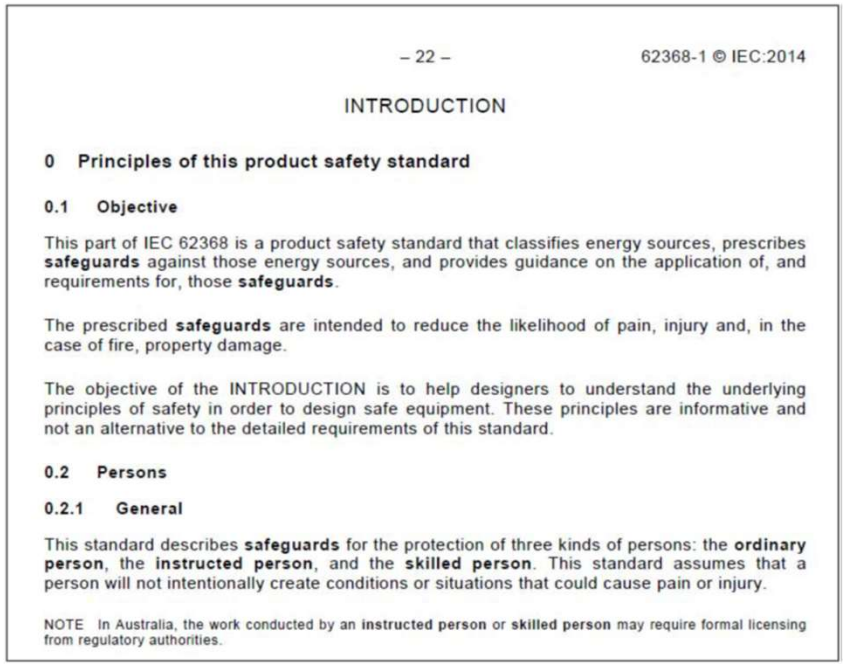
Some differences in test procedures from 60950-1 to 62368-1:

- Leakage current was lowered
- Dielectric test time is shorter
- Creepage & Clearance distance requirements are reduced

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 0 - Principles:

- **Excellent primer** (backgrounder) on the principles and HBSE approach the standard takes towards safety
- Should be studied as part of the initial learning of the standard



– 22 – 62368-1 © IEC:2014

INTRODUCTION

0 Principles of this product safety standard

0.1 Objective

This part of IEC 62368 is a product safety standard that classifies energy sources, prescribes **safeguards** against those energy sources, and provides guidance on the application of, and requirements for, those **safeguards**.

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

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

0.2 Persons

0.2.1 General

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

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

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 1 – Scope (and Annex A, Examples):

- Scope similar to IEC 60065 & IEC 60950-1
- Examples of products covered under scope provided in Annex A, essentially same examples as in IEC 60065 & IEC 60950-1

Annex A
(informative)

Examples of equipment within the scope of this standard

Some examples of equipment within the scope of this standard are:

Generic product type	Specific example of generic type
Banking equipment	Monetary processing machines including automated teller (cash dispensing) machines (ATM)
Consumer electronic equipment (including professional audio, video and musical instrument equipment)	Receiving equipment and amplifiers for sound and/or vision, supply equipment intended to supply other equipment covered by the scope of this standard, electronic musical instruments, and electronic accessories such as rhythm generators, tone generators, music tuners and the like for use with electronic or non-electronic musical instruments, audio and/or video educational equipment, video projectors, video cameras and video monitors, video games, juke boxes, record and optical disc players, tape and optical disc recorders, antenna signal converters and amplifiers, antenna positioners, Citizen's Band equipment, equipment for imagery, electronic light effect equipment, intercommunication equipment using low voltage mains as the transmission medium, cable head-end receivers, multimedia equipment, electronic flash equipment
Data and text processing machines and associated equipment	Data preparation equipment, data processing equipment, data storage equipment, personal computers, plotters, printers, scanners, text processing equipment, visual display units
Data network equipment	Bridges, data circuit terminating equipment, data terminal equipment, routers

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 2 – Normative references:

- Unlike IEC 60950-1, normative references in IEC 62368-1 are included in Clause 2, the structure more typically found in IEC standards
- In IEC 60950-1, normative references are in Annex P

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60027-1, *Letter symbols to be used in electrical technology – Part 1: General*

IEC 60065, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC/TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

IEC 60086-4, *Primary batteries – Part 4: Safety of lithium batteries*

IEC 60086-5, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

IEC 60107-1:1997, *Methods of measurement on receivers for television broadcast transmissions – Part 1: General considerations – Measurements at radio and video frequencies*

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60127 (all parts), *Miniature fuses*

IEC 60227-1, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60227-2:2003, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 2: Test methods*

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 3 – Terms, Definitions and Abbreviations:

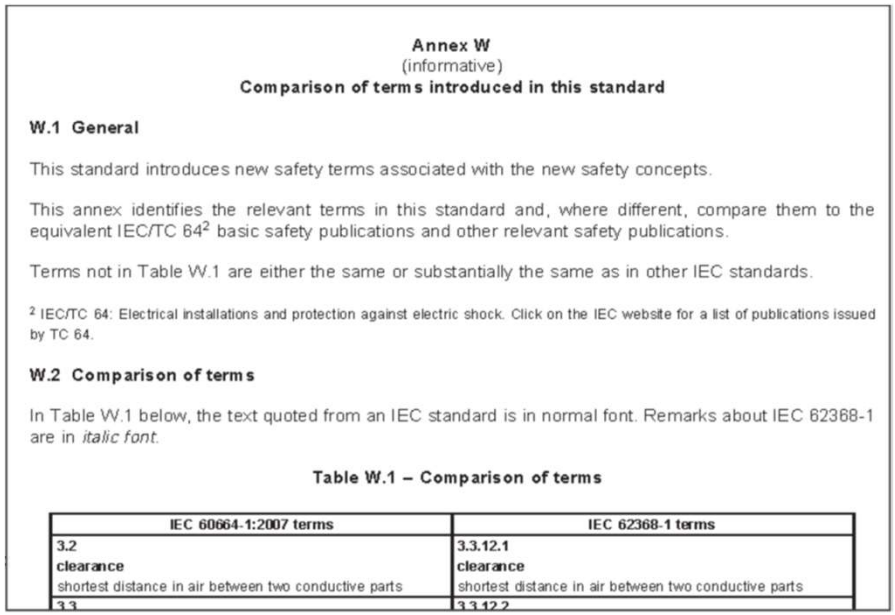
- Many familiar terms used in IEC 60950-1 are no longer in IEC 62368-1
- Examples

IEC 60950-1	IEC 62368-1
User (Operator)	Ordinary Person
Operator with limited training, i.e. allowed access to Restricted Access Location (RAL)	Instructed Person
Service Person	Skilled Person
SELV (Voltage based) LCC (Current based)	ES1 (considers both voltage & current)
TNV (i.e. TNV-1)	External Circuit, with transient considerations (i.e. ES1 with Table 16, ID Nos. 4, 6, 7)
Marking Instructions	Instructional Safeguard

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 3 – Terms, Definitions and Abbreviations:

- **Valuable reference – Annex W** (Informative) Comparison of terms introduced in this standard
  - Compares terms used in 62368-1 with terms used in IEC 60950-1 (ITE), IEC 60065 (AV), IEC 60664-1 (Insulation Coordination), IEC 61140 (Protection against electric shock), IEC 60728-11 (CATV), and IEC 62151 (Telecom)



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

W.1 General

This standard introduces new safety terms associated with the new safety concepts.

This annex identifies the relevant terms in this standard and, where different, compare them to the equivalent IEC/TC 64[2] basic safety publications and other relevant safety publications.

Terms not in Table W.1 are either the same or substantially the same as in other IEC standards.

[2] IEC/TC 64: Electrical installations and protection against electric shock. Click on the IEC website for a list of publications issued by TC 64.

W.2 Comparison of terms

In Table W.1 below, the text quoted from an IEC standard is in normal font. Remarks about IEC 62368-1 are in *italic font*.

Table W.1 – Comparison of terms

IEC 60664-1:2007 terms	IEC 62368-1 terms
3.2 **clearance** shortest distance in air between two conductive parts	3.3.12.1 **clearance** shortest distance in air between two conductive parts
3.3	3.3.12.2

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 4 – General Requirements:

- Many same elements as 60950-1's 1.3 (General Requirements), 1.4 (General Conditions – Tests) and 1.5 (Components)
- Includes general requirements, or points to Annexes, used throughout the standard, such as:
  - Use of components (4.1.2)
  - Constructions not specifically covered (4.1.5)
  - Temperature measurements (4.1.10)
  - Markings & Instructions (4.1.15)
  - Energy source classifications (4.2)
  - Protection against energy sources (4.3), and
  - Safeguards (4.4)

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 4 – General Requirements:

- IEC 62368-1 accommodates legacy components
- **4.1.1 – Application of requirements and acceptance of materials, components and subassemblies**
  - Components & subassemblies that comply with IEC 60950-1 or IEC 60065 are acceptable as part of equipment covered by this standard without further evaluation other than to give consideration to the appropriate use of the component or subassembly in the end-product
- Backward compatibility statements now also added to IEC 60065 & IEC 60950-1
- Provision eases transition & implementation

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

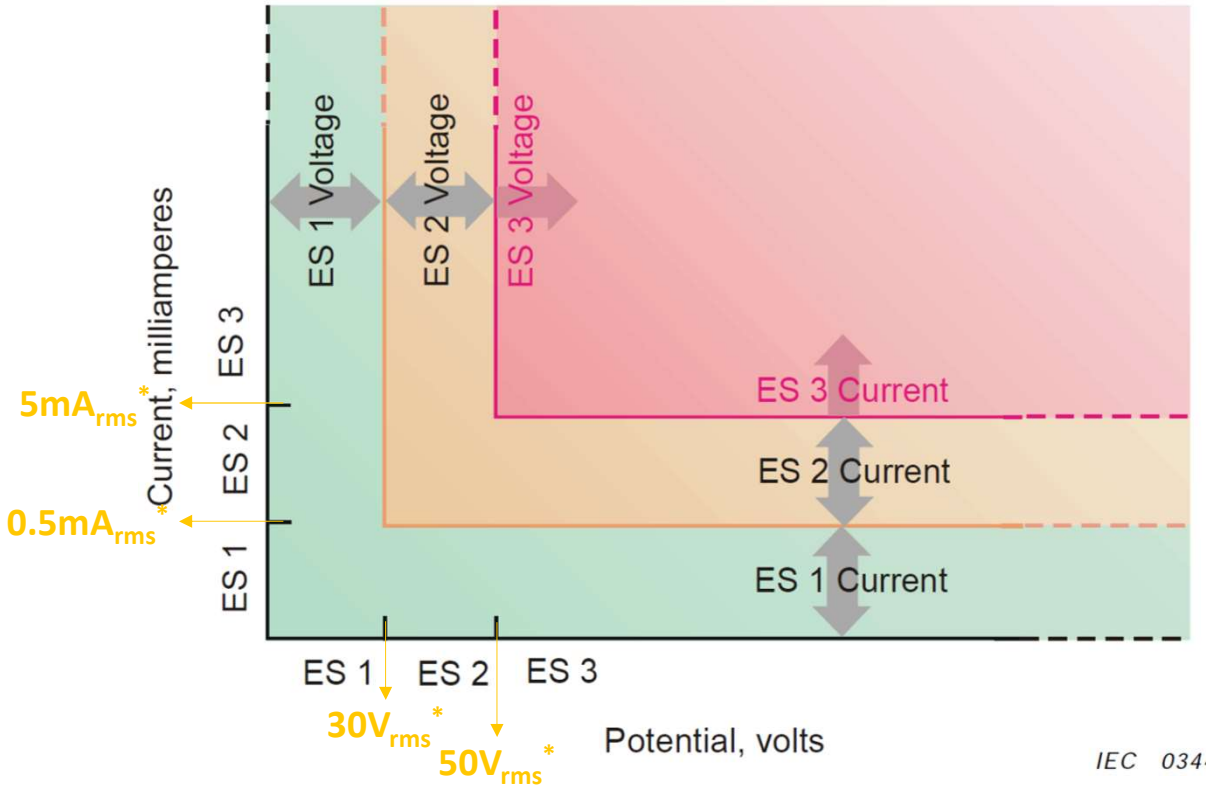
Clause 5 – Electrically-caused Injury:

Includes many well known elements, but presented in a different way, including:

- **Classification of energy sources (ES) (Cl. 5.2)**
- Levels of protection against hazardous energy sources (Cl. 5.3)
- Insulation materials as safeguards, including clearance, creepage distance, solid insulation, and electric strength (Cl. 5.4)
- Components as safeguards (Cl. 5.5)
- Protective conductors (earthing & bonding) as safeguards (Cl. 5.6)
- Touch voltage, Touch (leakage) current and protective conductor current (Cl. 5.7)

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 5 – Electrically-caused Injury:



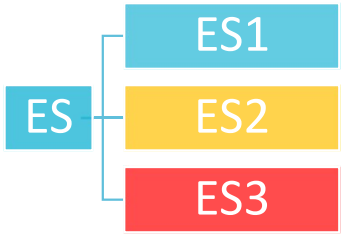
Note:
To not exceed limits under:

- Normal,
- Abnormal, and
- Single Fault operation conditions

*According to Table 4 limits

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 5 – Electrically-caused Injury:



1) **ES1** → Class 1 Energy Source; V ≤ 30 V r.m.s, ≤ 42.4 Vp (f < 1 kHz) ≤ 60 V d.c.
2) **ES2** → Class 2 Energy Source; V ≤ 50 V r.m.s, ≤ 70.7 Vp (f < 1 kHz) ≤ 120 V d.c.; limits for ES2 > ES1
3) **ES3** → Class 3 Energy Source; limits for ES3 > ES2

Note: See Table 4 for limits

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

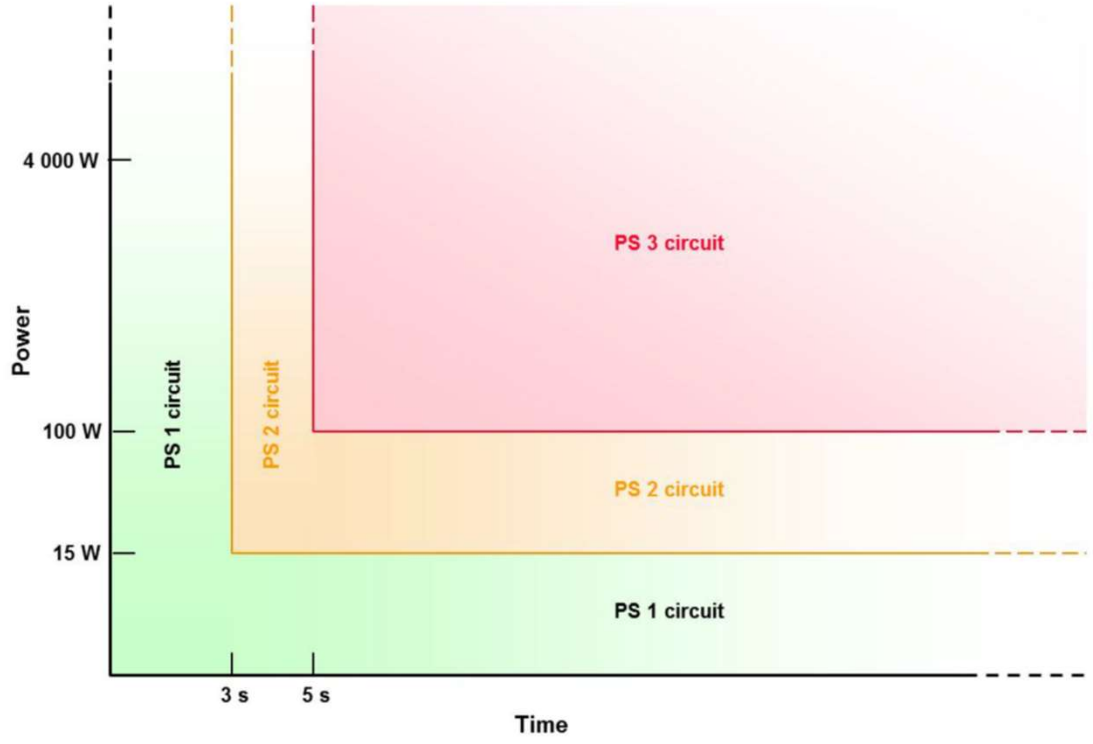
Clause 6 – Electrically-caused Fire:

Includes many well known elements, and some new elements, presented in a different way, including:

- **Classification of power sources (PS)** and potential ignition sources (PIS) **(Cl. 6.2)**
- Safeguarding under **normal** and **abnormal operating** conditions (Cl. 6.3)
  - Determined via **Heating Test**
- Safeguarding under **single fault** conditions (Cl. 6.4)
  - Includes **Fire Enclosures**
- Miscellaneous requirements, like flammability of wiring (Cl. 6.5), entry of foreign objects (Cl. 6.6) and connection to secondary equipment (Cl. 6.7)

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 6 – Electrically-caused Fire:

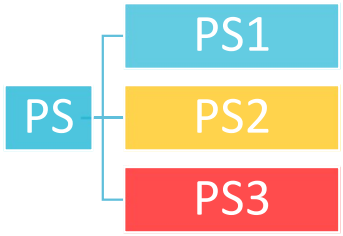


Note:
Power source measured under:

- Normal operating, and
- Worst case power source fault

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 6 – Electrically-caused Fire :



1) **PS1** → Class 1 PS Source; P ≤ 15 W, t ≥ 3 sec
2) **PS2** → Class 2 PS Source; 15 W < P ≤ 100 W, t ≥ 5 sec
3) **PS3** → Class 3 PS Source, PS3 > PS2

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 6 – Electrically-caused Fire:

Two Safeguards are required to prevent electrically-caused fire:

- **Basic Safeguard** – Use of suitably rated (thermal) materials under **Normal** & **Abnormal** operating conditions
- **Supplementary Safeguard** – Additional safeguard(s) provided for **Single Fault** considerations

For the **Supplementary Safeguard (for PS2 & PS3)**, two alternative paths:

a. Prevention of ignition

b. Control of fire spread

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 6 – Electrically-caused Fire:

- **Prevention of ignition** (aka single fault conditions)
  - ≈ IEC 60950-1 **Method 2** (4.7.1)
  - 4000W limitation (250V x 16A)
- **Control of fire spread** (aka fire enclosure)
  - ≈ IEC 60950-1 **Method 1** (4.7.1)

Standard / Flame Rating Matrix	V-1	5V
60950-1	≤ 18kg	> 18kg
62368-1	≤ 4000W	> 4000W

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 7 – Chemically-caused injury:

(Ed. 2 – Cl. 7 – Injury caused by hazardous substances)

- Only hazard clause (Cl. 5 – 10) in IEC 62368-1 that does not classify sources of potential injury by Class
- Not practical to try to do since various forms and quantities of chemicals/hazardous substances used in equipment covered under scope

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

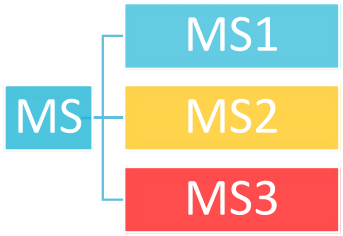
Clause 8 – Mechanically-caused injury:

- The '**K Factor**' concepts for classification of moving fan blades as **MS1, MS2** or **MS3** came from the UL standard for **Electric Fans, UL 507**
- In IEC 62368-1, Ed. 2, further distinction will be made between plastic blades and blades made of non-plastic materials

Line	Category	MS1	MS2	MS3
1	Sharp edges and corners	Does not cause pain or injury [b]	Does not cause injury [b] but may be painful	May cause injury [c]
2	Moving parts	Does not cause pain or injury [b]	Does not cause injury [b] but may be painful	May cause injury [c]
3a	Plastic fan blades [a] See Figure 44	$\frac{N}{15\ 000} + \frac{K}{2\ 400} \leq 1$	> MS1; and $\frac{N}{44\ 000} + \frac{K}{7\ 200} \leq 1$	> MS2
3b	Other fan blades [a] See Figure 43	$\frac{N}{15\ 000} + \frac{K}{2\ 400} \leq 1$	> MS1; and $\frac{N}{22\ 000} + \frac{K}{3\ 600} \leq 1$	> MS2
4	Loosening, exploding or imploding parts	NA	NA	See [d]
5	Equipment mass	≤ 7 kg	7 kg < mass ≤ 25 kg	> 25 kg
6	Wall/ceiling mount	Equipment mass ≤ 1 kg mounted ≤ 2 m [e]	Equipment mass > 1 kg mounted ≤ 2 m [e]	All equipment mounted > 2 m

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 8 – Mechanically-caused injury :



1) **MS1** → Class 1 MS Source
2) **MS2** → Class 2 MS Source; MS2 > MS1
3) **MS3** → Class 3 MS Source, MS3 > MS2

Note: See Table 35 for limits

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 9 – Thermal Burn Injury:

Includes well known elements, but presented in a different way, including:

- **Classification of thermal energy sources (TS) (Cl. 9.2)**
  - Per Heating (Temperature) Test
- Levels of protection against thermal energy sources (Cl. 9.3)
- Requirements for safeguards (Cl. 9.4)

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 9 – Thermal Burn Injury:

Touch temperature limits in IEC 62368-1 are in some cases lower than IEC 60950-1

- Based on **IEC Guide 117**, Electrotechnical equipment – Temperatures of touchable hot surfaces

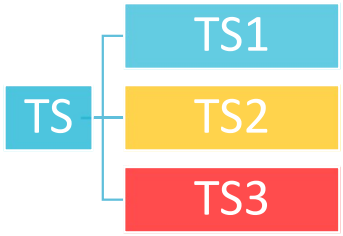
	Accessible parts [a]	Maximum temperature (T_{max}) °C			
		Metal [f]	Glass, porcelain and vitreous material	Plastic and rubber	Wood
TS1	Handles, knobs, grips, etc., and external surfaces either held, touched or worn against the body in normal use (> 1 min) [b, c]	48	48	48	48
	Handles, knobs, grips, etc., 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) [d]	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 …

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 9 – Thermal Burn Injury :



1) **TS1** → Class 1 TS Source, touch temp limit
2) **TS2** → Class 2 TS Source; limit is 10 K higher than TS1
3) **TS3** → Class 3 TS Source, higher than TS2 limit

Note: See Table 38 for limits

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 10 – Radiation:

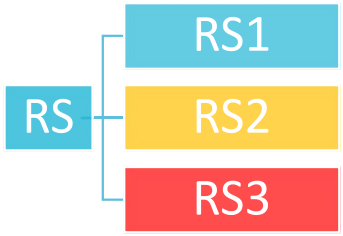
IEC 62368-1, Ed. 2 has Acoustic Radiation requirements for Personal Music Players closely aligned with the existing requirements in Europe:

- **EN 50332-1, -2**

  Sound system equipment. Headphones and earphones associated with portable audio equipment. Maximum sound pressure level measurement methodology and limit considerations.

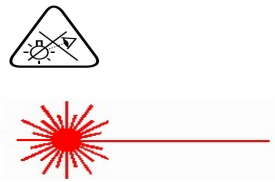
OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Clause 10 – Radiation :



1) **RS1** → Class 1 RS Source; RS1, RG 1, L_{Aeq}, t ≤ 85 dB(A)
2) **RS2** → Class 2 RS Source; RS2 > RS1 - L_{Aeq}, t ≤ 100 dB(A)
3) **RS3** → Class 3 RS Source, RS3 > RS2

Note: See Table 39 for limits



OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Annexes – Overview of some key annexes:

- **Annex B** (Normal operating condition, abnormal operating condition, and single-fault condition tests)
- **Annex F** (Equipment markings, instructions and instructional safeguards)
- **Annex G** (Components) – Allows for transformers complying with IEC 61204-7, IEC 61558-1, -2 & 2-16, and IEC 61558-2-16
- **Annex M** (Batteries), including cells & battery packs
- **Annex Q** (Interconnection with building wiring)
- **Annex T** (Mechanical strength tests)
- **Annex V** (Determination of accessible parts)

OVERVIEW & GAP ANALYSIS OF STANDARDS 60950-1 AND 62368-1

Annex F – Equipment markings, instructions, and instructional safeguards:

- **Annex F** outlines standardized approach for markings & related instructional safeguards

Element	Description	Example
1a	A symbol that identifies the nature of the class 2 or class 3 energy source or the consequences that can be caused by the class 2 or class 3 energy source.	
1b	A symbol such as ISO 7000-0434 (2004-01) or a combination of this symbol and ISO 7000-1641 (2004-01) to refer to text in an accompanying document. These symbols may be combined.	
2	Text that identifies the nature of the class 2 or class 3 energy source or the consequences that can be caused by the energy source, and the location of the energy source.	**Hot parts!**
3	Text that describes the possible consequences of energy transfer from the energy source to a body part.	Burned fingers when handling the parts
4	Text that describes the **safeguard** action necessary to avoid energy transfer to a body part.	Wait one-half hour after switching off before handling parts
The symbols for elements 1a and 1b shall be from IEC 60417, ISO 3864-2, ISO 7000, ISO 7010 or the equivalent.		

Hot parts!

Burned fingers when handling the parts

Wait one-half hour after switching off before handling parts

TRANSITION UPDATES

IEC 62368-1, Ed. 2 Adoption Status:

Countries adopted *	Countries NOT yet adopted *
Australia	Austria
Canada	Korea
CENELEC	Mexico
China	Norway
Finland	Poland
Italy	South Africa
Japan	Taiwan
Sweden	United Kingdom
USA	

* Note: As of December 2018 statistics

TRANSITION UPDATES

EU Announced Formal Transition Dates:

- CENELEC Date of Withdrawal (DOW) of Legacy Standards (EN 60065 / EN 60950-1):
  - ~~June 20, 2019 (Original)~~
  - **December 20, 2020** (adjusted per corrigendum @ Dec '16 meeting)
- Per active **Official Journal (OJ) of the EU** (September 14, 2018), date of cessation of presumption of conformity of superseded standards (60065 & 60950-1) with the essential requirements of the relevant Union legislation (LVD & RED) is **December 20, 2020**

Cenelec	EN 62368-1:2014 Audio/video, information and communication technology equipment — Part 1: Safety requirements (IEC 62368-1:2014, modified) IEC 62368-1:2014 (Modified)	8.7.2016	EN 60065:2014 + A11:2017 EN 60950-1:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 Note 2.1	20.12.2020
	EN 62368-1:2014/AC:2015			

TRANSITION UPDATES

Recent EU Activity on EN 62368-1 Ed. 2:

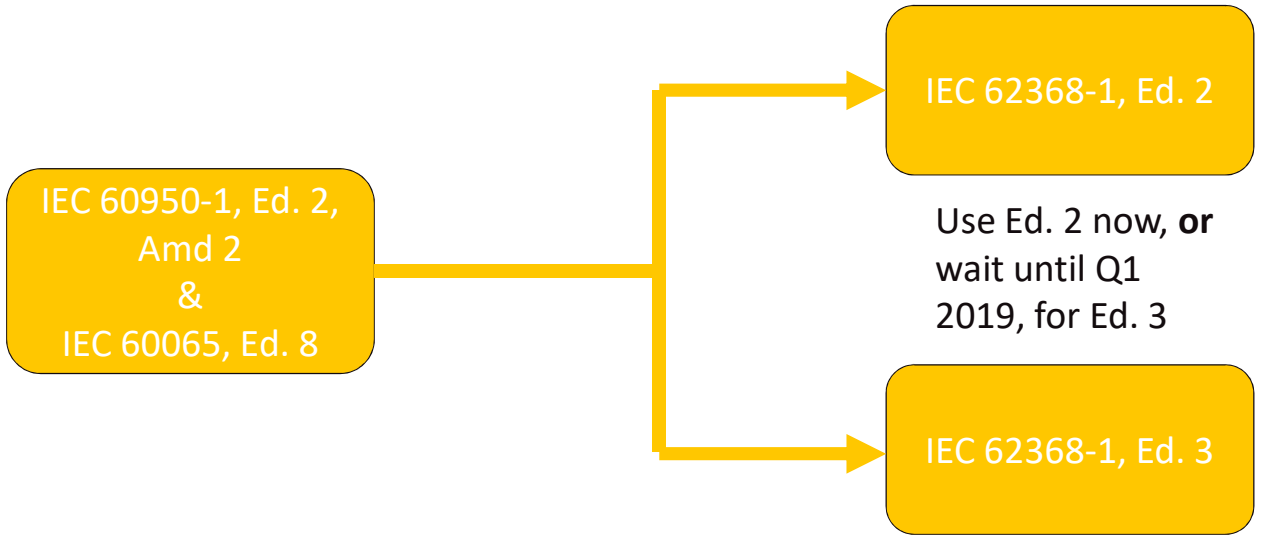
Important for Component / Power Supply Manufacturers

- **CENELEC** also agreed to remove the legacy component provision in 4.1.1 from Ed. 2 (effective December 20, 2020)
  - Legacy component provision also will be removed from Ed. 3 of EN 62368-1, even if IEC TC108 keeps it in
- In EU, after December 20, 2020, EN 60065 & EN 60950-1 certified components no longer will be permitted in equipment investigated to EN 62368-1 without additional investigation
- However, formal TC 108X amendment process only beginning

TRANSITION UPDATES

Manufacturer's Decision:

Bottom Line → Important **Decision** needed by **manufacturers** on transition from legacy standards, 60065 & 60950-1 to 62368-1



SUMMARY

- Perform Hazard Analysis
- Implement Required Safeguard
- Check Reliability of Safeguard

Note: Currently components Approved to IEC 60065 and IEC 60950-1 are acceptable until further notice to allow smooth transition.

Total Quality. Assured.