IEC TR 62368-2

Edition 4.0 2025-07

TECHNICAL REPORT

REDLINE VERSION

Audio/video, information and communication technology equipment -
Part 2: Explanatory information related to IEC 62368-1:2023

ICS 33.160.01

ISBN 978-2-8327-0562-9

CONTENTS

FOREWORD 8
INTRODUCTION 1
0 Principles of this product safety standard 12
1 Scope 15
2 Normative references 15
3 Terms, definitions and abbreviations 15
4 General requirements 18
4.2 Energy source classifications 21
4.6 Fixing of conductors and conductive parts 25
4.7 Equipment for direct insertion into mains socket-outlets 26
4.8 Equipment containing coin or button cell batteries 26
4.9 Likelihood of fire or shock due to entry of conductive objects 27
5 Electrically-caused injury 27
5.4 Insulation materials and requirements 43
5.5 Components as safeguards 70
5.6 Protective conductor 73
5.7 Prospective touch voltage, touch current and protective conductor current 75
5.8 Backfeed safeguard in battery backed up supplies 80
6 Electrically-caused fire 82
6.2 Classification of power sources and potential ignition sources 82
6.3 Safeguards against fire under normal operating conditions and abnormal operating conditions 86
6.4 Safeguards against fire under single fault conditions 92
6.6 Safeguards against fire due to the connection of additional equipment 120
7 Injury caused by hazardous substances 120
8 Mechanically-caused injury 124
8.1 General 124
8.2 Mechanical energy source classifications 124
8.3 Safeguards against mechanical energy sources 125
8.4 Safeguards against parts with sharp edges and corners 126
8.5 Safeguards against moving parts 126
8.6 Stability of equipment 127
8.7 Equipment mounted to a wall, ceiling or other structure 128
8.8 Handle strength 129
8.9 Wheels or casters attachment requirements 129
8.10 Carts, stands, and similar carriers 129
8.11 Mounting means for slide-rail mounted equipment (SRME) 130
9 Thermal burn injury 131
9.1 General 131
9.2 Thermal energy source classifications 135
9.3 Touch temperature limits 136
9.4 Safeguards against thermal energy sources 140
9.6 Requirements for wireless power transmitters 141
10 Radiation 142
10.2 Radiation energy source classifications 142
10.3 Safeguards against laser radiation 145

10.4 Safeguards against optical radiation from lamps and lamp systems (including LED types) 145
10.5 Safeguards against X-radiation 145
10.6 Safeguards against acoustic energy sources 145
Annex A Examples of equipment within the scope of ~~this standard~~ IEC 62368-1 149
Annex B Normal operating condition tests, abnormal operating condition tests and single fault condition tests 149
B.1 General – Equipment safeguards during various operating conditions 149
B.2 – B.3 – B.4 Operating modes 153
Annex C UV radiation 154
Annex D Test generators 154
Annex E Test conditions for equipment ~~containing audio amplifiers~~ intended to amplify audio signals 154
Annex F Equipment markings, instructions, and instructional safeguards 155
F.3 Equipment markings 155
F.4 Instructions 161
F.5 Instructional safeguards 161
Annex G Components 162
G.1 Switches 162
G.7 Mains power supply cords and interconnection cables 166
G.8 Varistors 166
G.9 Integrated circuit (IC) current limiters 167
G.11 Capacitors and RC units 168
G.13 Printed boards 172
G.14 Coatings on component terminals 172
G.15 Pressurized liquid filled components or LFC assemblies 172
Annex H Criteria for telephone ringing signals 179
H.2 Method A 179
H.3 Method B 181
Annex J Insulated winding wires for use without interleaved insulation 181
Annex K Safety interlocks 181
K.7.1 Safety interlocks 181
Annex L Disconnect devices 182
Annex M Equipment containing batteries and their protection circuits 183
M.1 General requirements 183
M.2 Safety of batteries and their cells 183
M.3 Protection circuits for batteries provided within the equipment 191
M.4 Additional safeguards for equipment containing a secondary lithium battery 191
Annex O Measurement of creepage distances and clearances 194
Annex P Safeguards against conductive objects 195
P.1 General 195
P.2 Safeguards against entry or consequences of entry of a foreign object 195
P.3 Safeguards against spillage of internal liquids 196
P.4 Metallized coatings and adhesives securing parts 197
Annex Q Circuits intended for interconnection with building wiring 197
Q.2 Test for external circuits – paired conductor cable 197
Annex R Limited short-circuit test 198

Annex S Tests for resistance to heat and fire 198
S.1 Flammability test for fire enclosure and fire barrier materials of equipment where the steady-state power does not exceed 4 000 W 198
S.2 Flammability test for fire enclosure and fire barrier integrity 198
S.3 Flammability tests for the bottom of a fire enclosure 199
S.4 Flammability classification of materials 199
S.5 Flammability test for fire enclosure materials of equipment with a steady state power exceeding 4 000 W 199
S.6 Grille covering material, cloth, and reticulated foam 200
Annex T Mechanical strength tests 200
T.2 Steady force test, 10 N 200
T.3 Steady force test, 30 N 200
T.4 Steady force test, 100 N 200
T.5 Steady force test, 250 N 200
T.6 Enclosure impact test 200
T.7 Drop test 201
T.8 Stress relief test 201
T.9 Glass impact test 201
T.10 Glass fragmentation test 201
Annex U Mechanical strength of CRTs and protection against the effects of implosion 201
U.2 Test method and compliance criteria for non-intrinsically protected CRTs 201
Annex V Determination of accessible parts 202
Annex X Alternative method for determining clearances for insulation in circuits connected to an AC mains not exceeding 420 V peak (300 V RMS) 202
Annex Y Construction requirements for outdoor enclosures 203
Y.3 Resistance to corrosion 204
Annex A (informative) Background information related to the use of ~~SPDs~~ surge suppressors 205
A.1 Industry demand for incorporating ~~SPDs~~ surge suppressors in the equipment 205
~~A.2 Technical environment of relevant component standards ..... ~~
~~A.3 Technical discussion ..... ~~
A.2 Considerations on surge suppressors bridging both sides of a safeguard 211
A.3 Considerations on a surge suppresser used for ID1 external circuit in class II equipment 212
A.4 Information about follow current (or follow-on current) 207
Annex B (informative) Background information related to measurement of discharges – Determining the R-C discharge time constant for X and Y capacitors 227
B.1 General 227
B.2 EMC filters 227
B.3 The safety issue and solution 227
B.4 The requirement 228
B.5 100 MΩ probes 228
B.6 The R-C time constant and its parameters 229
B.7 Time constant measurement. 232
B.8 Effect of probe resistance 235
B.9 Effect of probe capacitance 236
B.10 Determining the time constant 236
B.11 Conclusion 238

Annex C (informative) Background information related to resistance to candle flame ignition 239
Annex D (informative) Surge suppressers used between mains and an external circuit ID1 as specified in Table 13 240
Bibliography 241

Figure 1 – Risk reduction as given in ISO/IEC Guide 51 13
Figure 2 – HBSE Process Chart 14
Figure 3 – Protective bonding conductor as part of a safeguard 18
Figure 4 – Safeguards for protecting an ordinary person 22
Figure 5 – Safeguards for protecting an instructed person 22
Figure 6 – Safeguards for protecting a skilled person 23
Figure 7 – Flow chart showing the intent of the glass requirements 25
Figure 8 – Conventional time/current zones of effects of AC currents (15 Hz to 100 Hz) on persons for a current path corresponding to left hand to feet (see IEC ~~TS~~ 60479-1:~~2005~~2018, Figure 20) 30
Figure 9 – Conventional time/current zones of effects of DC currents on persons for a longitudinal upward current path (see IEC ~~TS~~ 60479-1:~~2005~~2018, Figure 22) 31
Figure 10 – Illustration that limits depend on both voltage and current 32
Figure 11 – Typical example 39
Figure 12 – Example 1 40
Figure 13 – Example 2 40
Figure 14 – Flow chart for determining clearances 47
Figure 15 – Illustration of working voltage 48
Figure 16 – Illustration of transient voltages on paired conductor external circuits 50
Figure 17 – Illustration of transient voltages on coaxial-cable external circuits 51
Figure 18 – Examples of transmission mode and applied conductors 52
Figure 19 – Basic and reinforced insulation in Table 14 ~~of IEC 62368-1:2018~~; ratio reinforced to basic 53
Figure 20 – Reinforced clearances according to Rule 1, Rule 2, and Table 14 55
Figure 21 – Example illustrating accessible internal wiring 63
Figure 22 – Waveform on insulation without surge suppressors and no breakdown 66
Figure 23 – Waveforms on insulation during breakdown without surge suppressors 66
Figure 24 – Waveforms on insulation with surge suppressors in operation 66
Figure 25 – Waveform on short-circuited surge suppressor and insulation 67
Figure 26 – Normal operating condition 68
Figure 27 – Single fault condition 68
Figure 28 – Single fault condition; hazardous situation if 5.4.11 is not fulfilled 69
Figure 29 – Parts earthed in one piece of equipment 69
Figure 30 – Equipment 2 with connection to a network 70
Figure 31 – Example for an ES2 source 70
Figure 32 – Example for an ES3 source 71
Figure 33 – Overview of protective conductors 73
Figure 34 – Example of a typical touch current measuring network 76
Figure 35 – Touch current from a floating circuit 78

Figure 36 – Touch current from an earthed circuit 78
Figure 37 – Summation of touch currents in a PABX 79
Figure 38 – Possible safeguards against electrically-caused fire 86
Figure 39 – Fire clause flow chart 89
Figure 40 – Prevent ignition flow chart 95
Figure 41 – Control fire spread summary 96
Figure 42 – Control fire spread PS2 97
Figure 43 – Control fire spread PS3 98
Figure 44 – Fire cone application to a large component 110
Figure 45 – Calculation of side opening size 117
Figure 46 – Flowchart demonstrating the hierarchy of hazard management 123
Figure 47 – Model for chemical injury 124
Figure 48 – Direction of forces to be applied 128
Figure 49 – Model for a burn injury 132
Figure 50 – Model for safeguards against thermal burn injury 134
Figure 51 – Model for absence of a thermal hazard 134
Figure 52 – Model for presence of a thermal hazard with a physical safeguard in place 134
Figure 53 – Model for presence of a thermal hazard with behavioural safeguard in place 135
Figure 54 – Direct plug in 137
Figure 55 – External power supply 137
Figure 56 – Examples of symmetrical single coils 142
Figure 57 – LED parameters 142
Figure 58 – Flowchart for evaluation of Image projectors (beamers) 144
Figure 59 – Graphical representation of $L_{\mathrm{Aeq},T}$ 146
Figure 60 – Overview of operating modes 153
Figure 61 – Typical examples of class I equipment 156
Figure 62 – Typical examples of class I equipment with class II construction 157
Figure 63 – Typical examples of class II equipment 158
Figure 64 – Typical examples of class II equipment with functional earth 159
Figure 65 – Typical examples of class II equipment with functional earth, making use of a class I mains connector 160
Figure 66 – Typical examples of class II equipment with functional earth, making use of a class I mains connector and a separate functional earthing connection 161
Figure 67 – Voltage-current characteristics (Typical data) 163
Figure 68 – Example of IC current limiter circuit 168
Figure 69 – Example of application of Rule 3, first dash 170
Figure 70 – Example of application of Rule 3, second dash 171
Figure 71 – Example on how to use Table G.12 171
Figure 72 – Decision flowchart 173
Figure 73 – Illustration of a self-contained LFC system 175
Figure 74 – Illustration of a modular LFC system 176
Figure 75 – Example illustration of a rack modular LFC subsystems with internal and external connections. 177

Figure 76 – CDU liquid cooling system within a data centre 178
Figure 77 – Non-CDU liquid cooling system within data centre 178
Figure 78 – Current limit curves 180
Figure 79 – Example of a dummy battery circuit 192
Figure 80 – Calculating side openings 196
Figure 81 – Example of a circuit with two power sources 198
Figure A.1 – Installation has poor earthing and bonding; equipment damaged (from ITU-T Recommendation K.66) 206
Figure A.2 – Installation has poor earthing and bonding; using main earth bar for protection against lightning strike (from ITU-T Recommendation K.66) 206
Figure A.3 – Installation with poor earthing and bonding, using a varistor ~~and a GDT for protection against a lightning strike~~ 207
Figure A.4 – Typical example of a surge suppressor and a voltage fall 207
~~Figure A.4 – Installation with poor earthing and bonding; equipment damaged (TV set) .....~~
~~Figure A.5 – Safeguards .....~~
Figure A.5 – An example of surge voltage drop by an MOV and two GDTs (measured in laboratory) 213
~~Figure A.6 – Discharge stages .....~~
Figure A.6 – An example of ports of telecommunication equipment 217
~~Figure A.8 – Discharge .....~~
Figure A.7 – V-I properties of gas discharge tubes 219
Figure A.8 – Holdover 220
Figure A.9 – Relation of the V-I characteristic of a gas discharge tube and the output characteristic of the power supply 221
Figure A.10 – V-I and V-t characteristics 224
Figure A.11 – Follow-on current pictures 225
Figure B.1 – Typical EMC filter schematic 227
Figure B.2 – 100 MΩ oscilloscope probes 229
Figure B.3 – Combinations of EUT resistance and capacitance for 1 s time constant 231
Figure B.4 – 240 V mains followed by capacitor discharge 233
Figure B.5 – Time constant measurement schematic 234
Figure B.6 – Worst-case measured time constant values for 100 MΩ and 10 MΩ probes 238
Figure D.1 – Example of circuit configuration of a surge suppresser 240

Table 1 – General summary of required safeguards 23
Table 2 – Time/current zones for AC 15 Hz to 100 Hz for hand to feet pathway (see IEC ~~TS~~ 60479-1:~~2005~~2018, Table 11) 30
Table 3 – Time/current zones for DC for hand to feet pathway (see IEC ~~TS~~ 60479-1:~~2005~~2018, Table 13) 31
Table 4 – Limit values of accessible capacitance (threshold of pain) 34
Table 5 – Total body resistances R_T for a current path hand to hand, DC, for large surface areas of contact in dry condition 37
Table 6 – Insulation requirements for external circuits 51
Table 7 – Voltage drop across clearance and solid insulation in series 57
Table 8 – Examples of application of various safeguards 88

Table 9 – Basic safeguards against fire under normal operating conditions and abnormal operating conditions 91
Table 10 – Supplementary safeguards against fire under single fault conditions 92
Table 11 – Method 1: Reduce the likelihood of ignition 94
Table 12 – Method 2: Control fire spread 102
Table 13 – Fire barrier and fire enclosure flammability requirements 112
Table 14 – Summary – Fire enclosure and fire barrier material requirements 116
Table 15 – Control of chemical hazards 122
Table 16 – Overview of requirements for dose-based systems 148
Table 17 – Overview of supply voltage 152
Table 18 – Safety of batteries and their cells – requirements (expanded information on documents and scope) 185
Table A.1 – Permissible power-frequency stress voltage (except for US and Japan) 213
Table A.2 – TOV parameters for US systems quoted from IEC 61643-12:2020 214
Table A.3 – TOV test parameters for Japanese systems quoted from IEC 61643-12:2020 214
Table A.4 – Peak voltage of TOV in countries conforming to IEC 60364-4-44 215
Table A.5 – Peak voltage of TOV in USA 215
Table A.6 – Peak voltage of TOV in Japan 215
Table A.7 – The value of U_{peak2} for major mains voltages 216
Table B.1 – 100 MΩ oscilloscope probes 229
Table B.2 – Capacitor discharge 230
Table B.3 – Maximum $T_{measured}$ values for combinations of R_{EUT} and C_{EUT} for T_{EUT} of 1 s 237

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Audio/video, information and communication technology equipment - Part 2: Explanatory information related to IEC 62368-1:2023

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC TR 62368-2:2018. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC TR 62368-2 has been prepared by IEC technical committee TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology. It is a Technical Report.

This fourth edition cancels and replaces the third edition published in 2018. This edition constitutes a technical revision.

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

a) It takes into account changes made in the fourth edition of IEC 62368-1 (IEC 62368-1:2023) as identified in the Foreword of IEC 62368-1:2023.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
108/794/DTR	108/825/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

In this document, the following print types are used:

– notes/explanatory matter: in smaller roman type;
– tables and figures that are included in the rationale have linked fields (shaded in grey if “field shading” is active);
– terms that are defined in IEC 62368-1: in **bold type**.

Where coloured shading is used:

– green colour stands for level 1 energy sources
– yellow/orange colour stands for level 2 energy sources
– red colour stands for level 3 energy sources.

In this document, where the term (HBSDT) is used, it stands for Hazard Based Standard Development Team, which is the Working Group of IEC TC 108 responsible for the development and maintenance of IEC 62368-1.

A list of all parts of the IEC 62368 series can be found, under the general title *Audio/video, information and communication technology equipment*, on the IEC website.

In this document, only those subclauses from IEC 62368-1 considered to need further background reference information or explanation to benefit the user in applying the relevant requirements are included. Therefore, not all numbered subclauses are cited. Unless otherwise noted, all references are to clauses, subclauses, annexes, figures or tables located in IEC 62368-1:2023.

The entries in this document can have one or two of the following subheadings in addition to the Rationale statement:

Source – where the source is known and is a document that is accessible to the general public, a reference is provided.

Purpose – where there is a need and when it can prove helpful to the understanding of the Rationale, a Purpose statement has been added.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

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

0 Principles of this product safety standard

Clause 0 is ~~informational~~ informative and provides a rationale for the normative clauses of ~~the document~~ IEC 62368-1:2023.

0.5.1 General

ISO/IEC Guide 51:2014, 6.3.5 states:

"When reducing risks, the order of priority shall be as follows:

a) inherently safe design;

*b) guards and protective **devices**;*

c) information for end users.

*Inherently safe design measures are the first and most important step in the risk reduction process. This is because protective measures inherent to the characteristics of the product or system are likely to remain effective, whereas experience has shown that even well-designed guards and protective **devices** can fail or be violated and information for use might not be followed.*

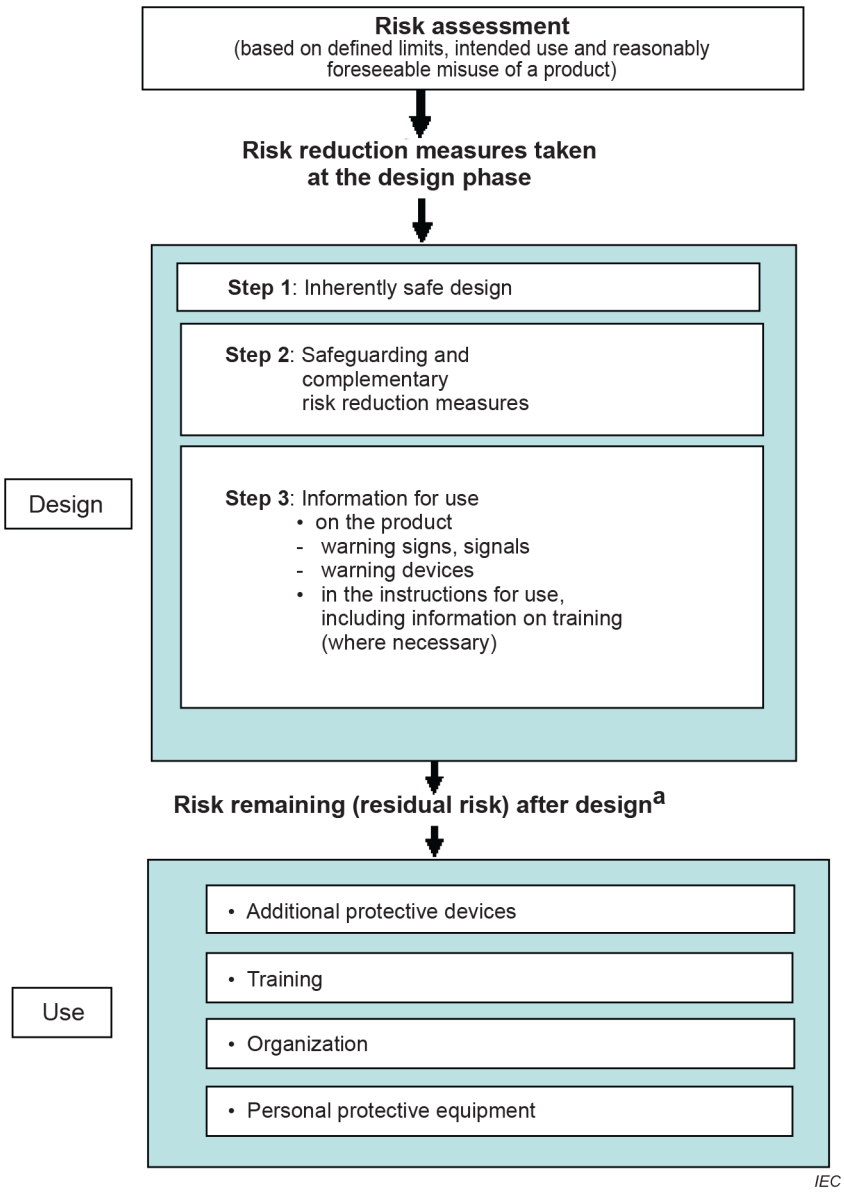
*Guards and protective **devices** shall be used whenever an inherently safe design measure does not reasonably make it possible either to remove hazards or to sufficiently reduce risks. Complementary protective measures involving additional equipment (for example, emergency stop equipment) might have to be implemented.*

The end user has a role to play in the risk reduction procedure by complying with the information provided by the designer/supplier. However, information for use shall not be a substitute for the correct application of inherently safe design measures, guards or complementary protective measures."

In general, this principle is used in IEC 62368-1. The table below shows a comparison between the hierarchy required in ISO/IEC Guide 51 and the hierarchy used in IEC 62368-1~~:2018~~.

ISO/IEC Guide 51	IEC 62368-1
a) inherently safe design	1. inherently safe design by limiting all energy hazards to class 1
b) guards and protective **devices**	2. **equipment safeguards**
	3. **installation safeguards**
	4. **personal safeguards**
c) information for end users	5. behavioural **safeguards**
	6. **instructional safeguards**

Risk assessment has been considered as part of the development of IEC 62368-1 as indicated in the following from ISO/IEC Guide 51 (Figure 1 in this document). See also the Hazard Based Safety Engineering (HBSE) Process Flow (Figure 2 in this document) that also provides additional details for the above comparison.



[a] An example is the risk remaining in a product or a system when supplied to a customer, or in a structural feature, after installation.

Figure 1 – Risk reduction as given in ISO/IEC Guide 51

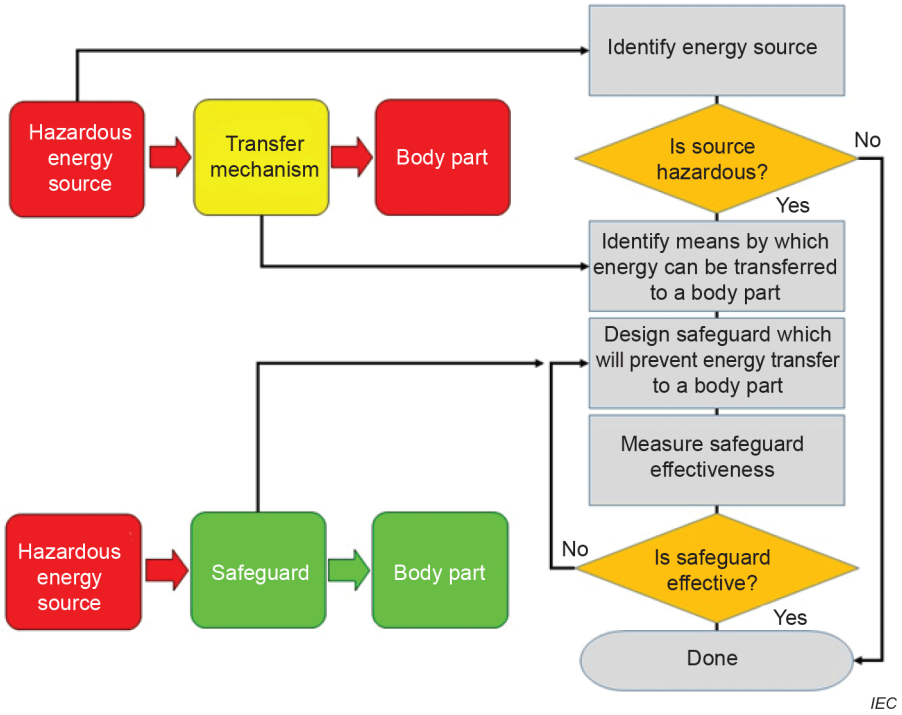


Figure 2 – HBSE Process Chart

0.5.7 Equipment safeguards during skilled person service conditions

Purpose: To explain the intent of requirements for providing **safeguards** against involuntary reaction.

Rationale: By definition, a **skilled person** has the education and experience to identify all class 3 energy sources to which he ~~may~~ can be exposed. However, while servicing one class 3 energy source in one location, a **skilled person** ~~may~~ can be exposed to another class 3 energy source in a different location.

In such a situation, either of two events is possible. First, something ~~may~~ can cause an involuntary reaction of the **skilled person** with the consequences of contact with the class 3 energy source in the different location. Second, the space in which the **skilled person** is located ~~may~~ can be small and cramped, and inadvertent contact with a class 3 energy source in the different location ~~may be~~ is likely.

In such situations, ~~this document may~~ IEC 62368-1:2023 can require an equipment **safeguard** solely for the protection of a **skilled person** while performing servicing activity.

0.10 Thermally-caused injury (skin burn)

Purpose: The requirements basically address **safeguards** against thermal energy transfer by conduction. They do not specifically address safeguards against thermal energy transfer by convection or radiation. However, as the temperatures from hot surfaces due to conduction are always higher than the radiated or convected temperatures, the requirements against convection and radiation are considered to be covered by the requirements against conducted energy transfer.

1 Scope

Purpose: To identify the purpose and applicability of ~~this document~~ IEC 62368-1:2023 and the exclusions from the scope.

Rationale: The scope excludes requirements for functional safety. Functional safety is addressed in IEC 61508-1. Because the scope includes computers that ~~may~~ can control safety systems, functional safety requirements would necessarily include requirements for computer processes and software.

The requirements provided in IEC 60950-23 ~~could~~ can be modified and added to IEC 62368 as another –X document. However, because of the hazard-based nature of IEC 62368-1, the requirements from IEC 60950-23 have been incorporated into the body of IEC 62368-1 and made more generic.

The intent of the addition of the IEC 60950-23 requirements is to maintain the overall intent of the technical requirements from IEC 60950-23, incorporate them into IEC 62368-1 following the overall format of IEC 62368-1 and simplify and facilitate the application of these requirements.

Robots traditionally are covered under the scopes of ISO documents, typically maintained by ISO TC 299. ISO TC 299 has working groups for personal care robots and service robots, and produces for example, ISO 13482, *Robots and robotic devices – Safety requirements for personal care robots*.

_____

2 Normative references

The list of normative references is a list of all documents that have a normative reference to them in the body of the document. As such, referenced documents are indispensable for the application of ~~this document~~ IEC 62368-1. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Recently, there were some issues with test houses that wanted to use the latest edition as soon as it was published. As this creates serious problems for manufacturers, since they have no chance to prepare, it was felt to be important that a reasonable transition period ~~should~~ be taken into account. This is in line with earlier decisions taken by the SMB that allow transition periods to be mentioned in the foreword of the documents. Therefore IEC TC 108 decided to indicate this in the introduction of the normative references clause, to instruct test houses to take into account any transition period, effective date or date of withdrawal established for the document.

These documents are referenced, in whole, in part, or as alternative requirements to the requirements contained in ~~this document~~ IEC 62368-1. Their use is specified, where necessary, for the application of the requirements of ~~this document~~ IEC 62368-1. The fact that a standard is mentioned in the list does not mean that compliance with the document or parts of it is required.

_____

IEC TR 62368-2

Edition 4.0 2025-07

TECHNICAL REPORT

Audio/video, information and communication technology equipment - Part 2: Explanatory information related to IEC 62368-1:2023

ICS 33.160.01

ISBN 978-2-8327-0533-9

IEC TR 62368-2:2025-07(en)

CONTENTS

FOREWORD 8
INTRODUCTION 11
0 Principles of this product safety standard 12
1 Scope 15
2 Normative references 15
3 Terms, definitions and abbreviations 15
4 General requirements 18
4.2 Energy source classifications 20
4.6 Fixing of conductors and conductive parts 24
4.7 Equipment for direct insertion into mains socket-outlets 25
4.8 Equipment containing coin or button cell batteries 25
4.9 Likelihood of fire or shock due to entry of conductive objects 26
5 Electrically-caused injury 26
5.4 Insulation materials and requirements 42
5.5 Components as safeguards 68
5.6 Protective conductor 71
5.7 Prospective touch voltage, touch current and protective conductor current 73
5.8 Backfeed safeguard in battery backed up supplies 78
6 Electrically-caused fire 80
6.2 Classification of power sources and potential ignition sources 80
6.3 Safeguards against fire under normal operating conditions and abnormal operating conditions 84
6.4 Safeguards against fire under single fault conditions 90
6.6 Safeguards against fire due to the connection of additional equipment 115
7 Injury caused by hazardous substances 115
8 Mechanically-caused injury 119
8.1 General 119
8.2 Mechanical energy source classifications 119
8.3 Safeguards against mechanical energy sources 120
8.4 Safeguards against parts with sharp edges and corners 121
8.5 Safeguards against moving parts 121
8.6 Stability of equipment 122
8.7 Equipment mounted to a wall, ceiling or other structure 123
8.8 Handle strength 124
8.9 Wheels or casters attachment requirements 124
8.10 Carts, stands, and similar carriers 124
8.11 Mounting means for slide-rail mounted equipment (SRME) 125
9 Thermal burn injury 126
9.1 General 126
9.2 Thermal energy source classifications 130
9.3 Touch temperature limits 131
9.4 Safeguards against thermal energy sources 135
9.6 Requirements for wireless power transmitters 136
10 Radiation 137
10.2 Radiation energy source classifications 137
10.3 Safeguards against laser radiation 140

10.4 Safeguards against optical radiation from lamps and lamp systems (including LED types) 140
10.5 Safeguards against X-radiation 140
10.6 Safeguards against acoustic energy sources 140
Annex A Examples of equipment within the scope of IEC 62368-1 144
Annex B Normal operating condition tests, abnormal operating condition tests and single fault condition tests 144
B.1 General – Equipment safeguards during various operating conditions 144
B.2 – B.3 – B.4 Operating modes 148
Annex C UV radiation 149
Annex D Test generators 149
Annex E Test conditions for equipment intended to amplify audio signals 149
Annex F Equipment markings, instructions, and instructional safeguards 150
F.3 Equipment markings 150
F.4 Instructions 156
F.5 Instructional safeguards 156
Annex G Components 157
G.1 Switches 157
G.7 Mains power supply cords and interconnection cables 161
G.8 Varistors 161
G.9 Integrated circuit (IC) current limiters 162
G.11 Capacitors and RC units 163
G.13 Printed boards 167
G.14 Coatings on component terminals 167
G.15 Pressurized liquid filled components or LFC assemblies 167
Annex H Criteria for telephone ringing signals 174
H.2 Method A 174
H.3 Method B 176
Annex J Insulated winding wires for use without interleaved insulation 176
Annex K Safety interlocks 176
K.7.1 Safety interlocks 176
Annex L Disconnect devices 177
Annex M Equipment containing batteries and their protection circuits 178
M.1 General requirements 178
M.2 Safety of batteries and their cells 178
M.3 Protection circuits for batteries provided within the equipment 186
M.4 Additional safeguards for equipment containing a secondary lithium battery 186
Annex O Measurement of creepage distances and clearances 189
Annex P Safeguards against conductive objects 190
P.1 General 190
P.2 Safeguards against entry or consequences of entry of a foreign object 190
P.3 Safeguards against spillage of internal liquids 191
P.4 Metallized coatings and adhesives securing parts 192
Annex Q Circuits intended for interconnection with building wiring 192
Q.2 Test for external circuits – paired conductor cable 192
Annex R Limited short-circuit test 193
Annex S Tests for resistance to heat and fire 193

S.1 Flammability test for fire enclosure and fire barrier materials of equipment where the steady-state power does not exceed 4 000 W 193
S.2 Flammability test for fire enclosure and fire barrier integrity 193
S.3 Flammability tests for the bottom of a fire enclosure 194
S.4 Flammability classification of materials 194
S.5 Flammability test for fire enclosure materials of equipment with a steady state power exceeding 4 000 W 194
S.6 Grille covering material, cloth, and reticulated foam 195
Annex T Mechanical strength tests 195
T.2 Steady force test, 10 N 195
T.3 Steady force test, 30 N 195
T.4 Steady force test, 100 N 195
T.5 Steady force test, 250 N 195
T.6 Enclosure impact test 195
T.7 Drop test 196
T.8 Stress relief test 196
T.9 Glass impact test 196
T.10 Glass fragmentation test 196
Annex U Mechanical strength of CRTs and protection against the effects of implosion 196
U.2 Test method and compliance criteria for non-intrinsically protected CRTs 196
Annex V Determination of accessible parts 197
Annex X Alternative method for determining clearances for insulation in circuits connected to an AC mains not exceeding 420 V peak (300 V RMS) 197
Annex Y Construction requirements for outdoor enclosures 198
Y.3 Resistance to corrosion 199
Annex A (informative) Background information related to the use of surge suppressors 200
A.1 Industry demand for incorporating surge suppressors in the equipment 200
A.2 Considerations on surge suppressors bridging both sides of a safeguard 202
A.3 Considerations on a surge suppresser used for ID1 external circuit in class II equipment 203
A.4 Information about follow current (or follow-on current) 209
Annex B (informative) Background information related to measurement of discharges – Determining the R-C discharge time constant for X and Y capacitors 215
B.1 General 215
B.2 EMC filters 215
B.3 The safety issue and solution 215
B.4 The requirement 216
B.5 100 MΩ probes 216
B.6 The R-C time constant and its parameters 217
B.7 Time constant measurement. 220
B.8 Effect of probe resistance 223
B.9 Effect of probe capacitance 224
B.10 Determining the time constant 224
B.11 Conclusion 226
Annex C (informative) Background information related to resistance to candle flame ignition 227
Annex D (informative) Surge suppressers used between mains and an external circuit ID1 as specified in Table 13 228

Bibliography 229

Figure 1 – Risk reduction as given in ISO/IEC Guide 51 13
Figure 2 – HBSE Process Chart 14
Figure 3 – Protective bonding conductor as part of a safeguard 17
Figure 4 – Safeguards for protecting an ordinary person 21
Figure 5 – Safeguards for protecting an instructed person 22
Figure 6 – Safeguards for protecting a skilled person 22
Figure 7 – Flow chart showing the intent of the glass requirements 24
Figure 8 – Conventional time/current zones of effects of AC currents (15 Hz to 100 Hz) on persons for a current path corresponding to left hand to feet (see IEC 60479-1:2018, Figure 20) 29
Figure 9 – Conventional time/current zones of effects of DC currents on persons for a longitudinal upward current path (see IEC 60479-1:2018, Figure 22) 30
Figure 10 – Illustration that limits depend on both voltage and current 31
Figure 11 – Typical example 38
Figure 12 – Example 1 39
Figure 13 – Example 2 39
Figure 14 – Flow chart for determining clearances 45
Figure 15 – Illustration of working voltage 46
Figure 16 – Illustration of transient voltages on paired conductor external circuits 48
Figure 17 – Illustration of transient voltages on coaxial-cable external circuits 49
Figure 18 – Examples of transmission mode and applied conductors 50
Figure 19 – Basic and reinforced insulation in Table 14; ratio reinforced to basic 51
Figure 20 – Reinforced clearances according to Rule 1, Rule 2, and Table 14 53
Figure 21 – Example illustrating accessible internal wiring 61
Figure 22 – Waveform on insulation without surge suppressors and no breakdown 63
Figure 23 – Waveforms on insulation during breakdown without surge suppressors 64
Figure 24 – Waveforms on insulation with surge suppressors in operation 64
Figure 25 – Waveform on short-circuited surge suppressor and insulation 64
Figure 26 – Normal operating condition 66
Figure 27 – Single fault condition 66
Figure 28 – Single fault condition; hazardous situation if 5.4.11 is not fulfilled 67
Figure 29 – Parts earthed in one piece of equipment 67
Figure 30 – Equipment 2 with connection to a network 68
Figure 31 – Example for an ES2 source 68
Figure 32 – Example for an ES3 source 69
Figure 33 – Overview of protective conductors 71
Figure 34 – Example of a typical touch current measuring network 74
Figure 35 – Touch current from a floating circuit 76
Figure 36 – Touch current from an earthed circuit 76
Figure 37 – Summation of touch currents in a PABX 77
Figure 38 – Possible safeguards against electrically-caused fire 84
Figure 39 – Fire clause flow chart 87

Figure 40 – Prevent ignition flow chart 93
Figure 41 – Control fire spread summary 94
Figure 42 – Control fire spread PS2 95
Figure 43 – Control fire spread PS3 96
Figure 44 – Fire cone application to a large component 105
Figure 45 – Calculation of side opening size 112
Figure 46 – Flowchart demonstrating the hierarchy of hazard management 118
Figure 47 – Model for chemical injury 119
Figure 48 – Direction of forces to be applied 123
Figure 49 – Model for a burn injury 127
Figure 50 – Model for safeguards against thermal burn injury 129
Figure 51 – Model for absence of a thermal hazard 129
Figure 52 – Model for presence of a thermal hazard with a physical safeguard in place 129
Figure 53 – Model for presence of a thermal hazard with behavioural safeguard in place 130
Figure 54 – Direct plug in 132
Figure 55 – External power supply 132
Figure 56 – Examples of symmetrical single coils 137
Figure 57 – LED parameters 137
Figure 58 – Flowchart for evaluation of Image projectors (beamers) 139
Figure 59 – Graphical representation of $L_{\mathrm{Aeq},T}$ 141
Figure 60 – Overview of operating modes 148
Figure 61 – Typical examples of class I equipment 151
Figure 62 – Typical examples of class I equipment with class II construction 152
Figure 63 – Typical examples of class II equipment 153
Figure 64 – Typical examples of class II equipment with functional earth 154
Figure 65 – Typical examples of class II equipment with functional earth, making use of a class I mains connector 155
Figure 66 – Typical examples of class II equipment with functional earth, making use of a class I mains connector and a separate functional earthing connection 156
Figure 67 – Voltage-current characteristics (Typical data) 158
Figure 68 – Example of IC current limiter circuit 163
Figure 69 – Example of application of Rule 3, first dash 165
Figure 70 – Example of application of Rule 3, second dash 166
Figure 71 – Example on how to use Table G.12 166
Figure 72 – Decision flowchart 168
Figure 73 – Illustration of a self-contained LFC system 170
Figure 74 – Illustration of a modular LFC system 171
Figure 75 – Example illustration of a rack modular LFC subsystems with internal and external connections. 172
Figure 76 – CDU liquid cooling system within a data centre 173
Figure 77 – Non-CDU liquid cooling system within data centre 173
Figure 78 – Current limit curves 175
Figure 79 – Example of a dummy battery circuit 187

Figure 80 – Calculating side openings 191
Figure 81 – Example of a circuit with two power sources 193
Figure A.1 – Installation has poor earthing and bonding; equipment damaged (from ITU-T Recommendation K.66) 201
Figure A.2 – Installation has poor earthing and bonding; using main earth bar for protection against lightning strike (from ITU-T Recommendation K.66) 201
Figure A.3 – Installation with poor earthing and bonding, using a varistor 202
Figure A.4 – Typical example of a surge suppressor and a voltage fall 202
Figure A.5 – An example of surge voltage drop by an MOV and two GDTs (measured in laboratory) 204
Figure A.6 – An example of ports of telecommunication equipment 208
Figure A.7 – V-I properties of gas discharge tubes 210
Figure A.8 – Holdover 211
Figure A.9 – Relation of the V-I characteristic of a gas discharge tube and the output characteristic of the power supply 212
Figure A.10 – V-I and V-t characteristics 213
Figure A.11 – Follow-on current pictures 214
Figure B.1 – Typical EMC filter schematic 215
Figure B.2 – 100 MΩ oscilloscope probes 217
Figure B.3 – Combinations of EUT resistance and capacitance for 1 s time constant 219
Figure B.4 – 240 V mains followed by capacitor discharge 221
Figure B.5 – Time constant measurement schematic 222
Figure B.6 – Worst-case measured time constant values for 100 MΩ and 10 MΩ probes 226
Figure D.1 – Example of circuit configuration of a surge suppresser 228

Table 1 – General summary of required safeguards 22
Table 2 – Time/current zones for AC 15 Hz to 100 Hz for hand to feet pathway (see IEC 60479-1:2018, Table 11) 30
Table 3 – Time/current zones for DC for hand to feet pathway (see IEC 60479-1:2018, Table 13) 31
Table 4 – Limit values of accessible capacitance (threshold of pain) 34
Table 5 – Total body resistances R_T for a current path hand to hand, DC, for large surface areas of contact in dry condition 36
Table 6 – Insulation requirements for external circuits 49
Table 7 – Voltage drop across clearance and solid insulation in series 55
Table 8 – Examples of application of various safeguards 86
Table 9 – Basic safeguards against fire under normal operating conditions and abnormal operating conditions 89
Table 10 – Supplementary safeguards against fire under single fault conditions 90
Table 11 – Method 1: Reduce the likelihood of ignition 92
Table 12 – Method 2: Control fire spread 100
Table 13 – Fire barrier and fire enclosure flammability requirements 107
Table 14 – Summary – Fire enclosure and fire barrier material requirements 111
Table 15 – Control of chemical hazards 117
Table 16 – Overview of requirements for dose-based systems 143

Table 17 – Overview of supply voltage 147
Table 18 – Safety of batteries and their cells – requirements (expanded information on documents and scope) 180
Table A.1 – Permissible power-frequency stress voltage (except for US and Japan) 204
Table A.2 – TOV parameters for US systems quoted from IEC 61643-12:2020 205
Table A.3 – TOV test parameters for Japanese systems quoted from IEC 61643-12:2020 205
Table A.4 – Peak voltage of TOV in countries conforming to IEC 60364-4-44 206
Table A.5 – Peak voltage of TOV in USA 206
Table A.6 – Peak voltage of TOV in Japan 206
Table A.7 – The value of U_{peak2} for major mains voltages 207
Table B.1 – 100 MΩ oscilloscope probes 217
Table B.2 – Capacitor discharge 218
Table B.3 – Maximum $T_{measured}$ values for combinations of R_{EUT} and C_{EUT} for T_{EUT} of 1 s 225

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Audio/video, information and communication technology equipment - Part 2: Explanatory information related to IEC 62368-1:2023

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC TR 62368-2 has been prepared by IEC technical committee TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology. It is a Technical Report.

This fourth edition cancels and replaces the third edition published in 2018. This edition constitutes a technical revision.

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

a) It takes into account changes made in the fourth edition of IEC 62368-1 (IEC 62368-1:2023) as identified in the Foreword of IEC 62368-1:2023.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
108/794/DTR	108/825/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

In this document, the following print types are used:

– notes/explanatory matter: in smaller roman type;
– tables and figures that are included in the rationale have linked fields (shaded in grey if “field shading” is active);
– terms that are defined in IEC 62368-1: in **bold type**.

Where coloured shading is used:

– green colour stands for level 1 energy sources
– yellow/orange colour stands for level 2 energy sources
– red colour stands for level 3 energy sources.

In this document, where the term (HBSDT) is used, it stands for Hazard Based Standard Development Team, which is the Working Group of IEC TC 108 responsible for the development and maintenance of IEC 62368-1.

A list of all parts of the IEC 62368 series can be found, under the general title *Audio/video, information and communication technology equipment*, on the IEC website.

In this document, only those subclauses from IEC 62368-1 considered to need further background reference information or explanation to benefit the user in applying the relevant requirements are included. Therefore, not all numbered subclauses are cited. Unless otherwise noted, all references are to clauses, subclauses, annexes, figures or tables located in IEC 62368-1:2023.

The entries in this document can have one or two of the following subheadings in addition to the Rationale statement:

Source – where the source is known and is a document that is accessible to the general public, a reference is provided.

Purpose – where there is a need and when it can prove helpful to the understanding of the Rationale, a Purpose statement has been added.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

IEC 62368-1 is based on the principles of hazard-based safety engineering, which is a different way of developing and specifying safety considerations than that of the current practice. While IEC 62368-1 is different from traditional IEC safety documents in its approach and while it is believed that IEC 62368-1 provides a number of advantages, its introduction and evolution are not intended to result in significant changes to the existing safety philosophy that led to the development of the safety requirements contained in IEC 60065 and IEC 60950-1. The predominant reason behind the creation of IEC 62368-1 is to simplify the problems created by the merging of the technologies of ITE and CE. The techniques used are novel, so a learning process and experience in its application are needed.

0 Principles of this product safety standard

Clause 0 is informative and provides a rationale for the normative clauses of IEC 62368-1:2023.

0.5.1 General

ISO/IEC Guide 51:2014, 6.3.5 states:

"When reducing risks, the order of priority shall be as follows:

a) inherently safe design;

*b) guards and protective **devices**;*

c) information for end users.

*Inherently safe design measures are the first and most important step in the risk reduction process. This is because protective measures inherent to the characteristics of the product or system are likely to remain effective, whereas experience has shown that even well-designed guards and protective **devices** can fail or be violated and information for use might not be followed.*

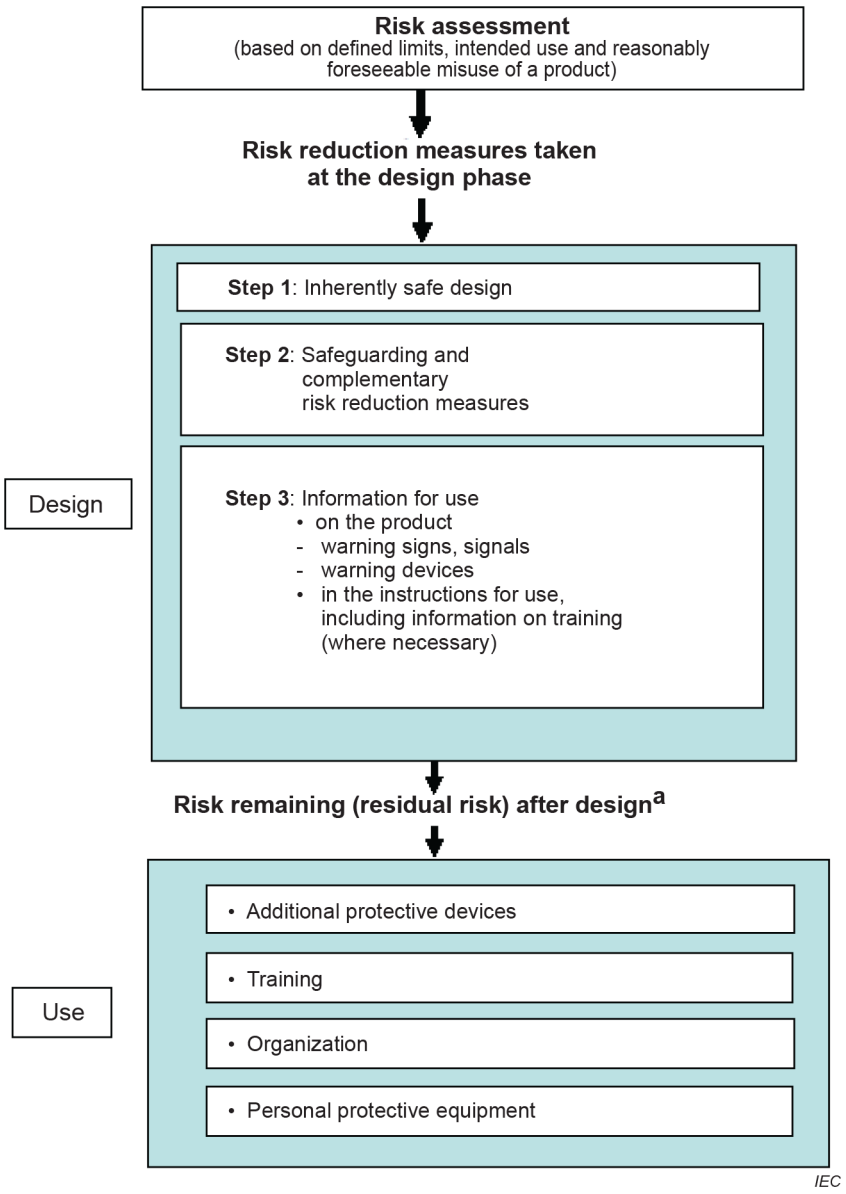
*Guards and protective **devices** shall be used whenever an inherently safe design measure does not reasonably make it possible either to remove hazards or to sufficiently reduce risks. Complementary protective measures involving additional equipment (for example, emergency stop equipment) might have to be implemented.*

The end user has a role to play in the risk reduction procedure by complying with the information provided by the designer/supplier. However, information for use shall not be a substitute for the correct application of inherently safe design measures, guards or complementary protective measures."

In general, this principle is used in IEC 62368-1. The table below shows a comparison between the hierarchy required in ISO/IEC Guide 51 and the hierarchy used in IEC 62368-1.

ISO/IEC Guide 51	IEC 62368-1
a) inherently safe design	1. inherently safe design by limiting all energy hazards to class 1
b) guards and protective **devices**	2. **equipment safeguards**
	3. **installation safeguards**
	4. **personal safeguards**
c) information for end users	5. behavioural **safeguards**
	6. **instructional safeguards**

Risk assessment has been considered as part of the development of IEC 62368-1 as indicated in the following from ISO/IEC Guide 51 (Figure 1 in this document). See also the Hazard Based Safety Engineering (HBSE) Process Flow (Figure 2 in this document) that also provides additional details for the above comparison.



[a] An example is the risk remaining in a product or a system when supplied to a customer, or in a structural feature, after installation.

Figure 1 – Risk reduction as given in ISO/IEC Guide 51

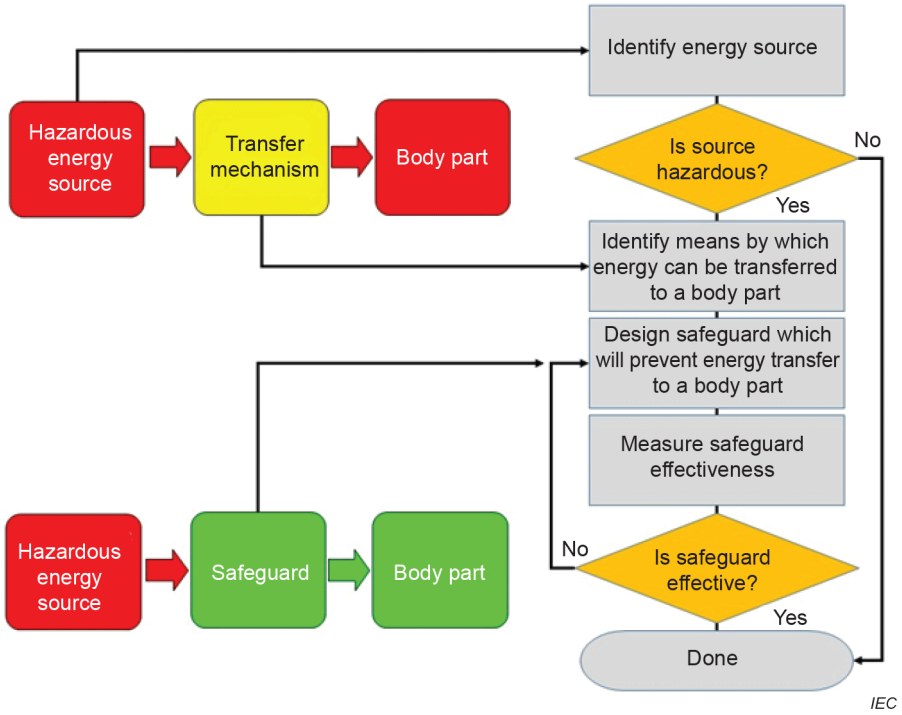


Figure 2 – HBSE Process Chart

0.5.7 Equipment safeguards during skilled person service conditions

Purpose: To explain the intent of requirements for providing **safeguards** against involuntary reaction.

Rationale: By definition, a **skilled person** has the education and experience to identify all class 3 energy sources to which he can be exposed. However, while servicing one class 3 energy source in one location, a **skilled person** can be exposed to another class 3 energy source in a different location.

In such a situation, either of two events is possible. First, something can cause an involuntary reaction of the **skilled person** with the consequences of contact with the class 3 energy source in the different location. Second, the space in which the **skilled person** is located can be small and cramped, and inadvertent contact with a class 3 energy source in the different location is likely.

In such situations, IEC 62368-1:2023 can require an equipment **safeguard** solely for the protection of a **skilled person** while performing servicing activity.

0.10 Thermally-caused injury (skin burn)

Purpose: The requirements basically address **safeguards** against thermal energy transfer by conduction. They do not specifically address safeguards against thermal energy transfer by convection or radiation. However, as the temperatures from hot surfaces due to conduction are always higher than the radiated or convected temperatures, the requirements against convection and radiation are considered to be covered by the requirements against conducted energy transfer.

1 Scope

Purpose: To identify the purpose and applicability of IEC 62368-1:2023 and the exclusions from the scope.

Rationale: The scope excludes requirements for functional safety. Functional safety is addressed in IEC 61508-1. Because the scope includes computers that can control safety systems, functional safety requirements would necessarily include requirements for computer processes and software.

The requirements provided in IEC 60950-23 can be modified and added to IEC 62368 as another –X document. However, because of the hazard-based nature of IEC 62368-1, the requirements from IEC 60950-23 have been incorporated into the body of IEC 62368-1 and made more generic.

The intent of the addition of the IEC 60950-23 requirements is to maintain the overall intent of the technical requirements from IEC 60950-23, incorporate them into IEC 62368-1 following the overall format of IEC 62368-1 and simplify and facilitate the application of these requirements.

Robots traditionally are covered under the scopes of ISO documents, typically maintained by ISO TC 299. ISO TC 299 has working groups for personal care robots and service robots, and produces for example, ISO 13482, *Robots and robotic devices – Safety requirements for personal care robots*.

_____

2 Normative references

The list of normative references is a list of all documents that have a normative reference to them in the body of the document. As such, referenced documents are indispensable for the application of IEC 62368-1. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Recently, there were some issues with test houses that wanted to use the latest edition as soon as it was published. As this creates serious problems for manufacturers, since they have no chance to prepare, it was felt to be important that a reasonable transition period be taken into account. This is in line with earlier decisions taken by the SMB that allow transition periods to be mentioned in the foreword of the documents. Therefore IEC TC 108 decided to indicate this in the introduction of the normative references clause, to instruct test houses to take into account any transition period, effective date or date of withdrawal established for the document.

These documents are referenced, in whole, in part, or as alternative requirements to the requirements contained in IEC 62368-1. Their use is specified, where necessary, for the application of the requirements of IEC 62368-1. The fact that a standard is mentioned in the list does not mean that compliance with the document or parts of it is required.

_____