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Guidance and Comparison between 60950-1 and 62368-1

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Contents

Page

Introduction

This Technical Report provides a mapping and comparison between the clauses of the traditional IEC 60950-1 and the corresponding clauses, requirements and test methods in the new IEC 62368-1 standard.

The tables in this TR identify the corresponding requirements and test methods in IEC 62368-1 for each clause in IEC 60950-1; Notable differences between the standards are highlighted to help:

- those familiar with IEC 60950-1 to adopt the Hazard Based Safety principles in equipment design; and

- assess the potential impact of requirements in IEC 62368-1 on existing equipment which has been designed using IEC 60950-1.

This Ecma Technical Report has been adopted by the General Assembly of <month> <year>.

Guidance and Comparison between 60950-1 and 62368-1

1 Scope

This Technical Report provides a mapping and comparison between the clauses of the traditional IEC 60950-1 Second edition, 2005-12 and the corresponding clauses, requirements and test methods in the new IEC 62368-1 Edition 1.0, 2010-01 standard.

2 References

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

IEC 60950-1 Second edition, 2005-12, *Information technology equipment – Safety – Part 1: General requirements* and Amendment 1.

IEC 62368-1 Edition 1.0, 2010-01, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

See IEC 62368-1, Annex W, which identifies the relevant terms in IEC 62368-1 and, where different, compares them to the equivalent IEC/TC 642 basic safety publications and other relevant safety publications.

4 Notation

The left hand column lists the IEC 60950-1 clauses in order.

The right-hand column lists the corresponding clauses, requirements and test methods in IEC 62368-1.

When a single clause in IEC 60950-1 is covered by several items in IEC-62386-1, this is indicated by a single cell on the left-hand side and multiple cells on the right-hand side. Conversely, when a single clause in IEC 62368-1 covers several items in IEC 60950-1, this is indicated by a single cell on the right hand side and multiple cells on the left-hand side.

Guidance is provided in red italic Arial typeface, e.g.: *New hazard-based concept.*

Quoted text is copied in blue non-italic Arial typeface e.g.: temporary operating condition that is not a **normal operating condition** and is not a **single fault condition** of the equipment itself.

Quoted defined terms are in non-italic Arial typeface, either

small upper case letters, ENCLOSURE (IEC 60950-1) or

bold lower-case letters **single fault condition** (IEC 62368-1).

5 Major differences

IEC 62368-1 is organized by energy source. IEC 62368-1 introduces the concept of safeguards and specifies safeguard requirements.

IEC 60950-1, Clause 0, Principles of safety:

IEC 60950-1, Clause 0 and IEC 62368-1 Clause 0 are completely different as the basis for the two standards is quite different. Hence, the comparison table does not include Clause 0 from either standard.

IEC 62368-1, Clause 7, Chemically-caused injury:

IEC 60950-1 does not specifically address injury due to chemicals. IEC 62368-1 includes requirements for safeguards against chemical injury. The comparison table does not include Clause 7.

IEC 62368-1, Annex G, Components:

In IEC 62368-1, component requirements are specified in Annex G. In IEC 60950-1, component requirements are specified in the various clauses. For each IEC 60950-1 component requirement, the comparison table indicates the equivalent IEC 62368-1 Annex G sub-clause. The comparison table does not specifically include Annex G.

IEC 62368-1, Annex W, Comparison of terms introduced in this standard:

Annex W provides a comparison of terms in various IEC standards with terms in IEC 62368-1. IEC 60950-1 does not have such a comparison. The comparison table does not include Annex W.

6 Mapping and comparison

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1 General	*Organization is different*
1.1 Scope	1 Scope This International Standard is applicable to the safety of electrical and electronic equipment within the field of audio, video, information and communication technology, and business and office machines with a **rated voltage** not exceeding 600 V. This standard does not include requirements for performance or functional characteristics of equipment.
1.1.1 Equipment covered by this standard This standard is applicable to mains-powered or battery-powered information technology equipment, including electrical business equipment and associated equipment, with a RATED VOLTAGE not exceeding 600 V. *Examples of equipment are given in the table.*	*No similar heading. Refer to 1 Scope.* Annex A (informative) Examples of equipment within the scope of this standard *Consumer electronic equipment is added to the table, which is otherwise the same.*
1.1.2 Additional requirements	*No equivalent statement.*
1.1.3 Exclusions	*No equivalent statement. See Scope for equipment and processes that are not covered.*
No similar heading.	3 Terms, definitions and abbreviations
No similar heading.	3.1 General

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No similar headings.	3.2 Terms and abbreviations 3.2.1 Terms in alphabetical order 3.2.2 Abbreviations in alphabetical order
1.2 Definitions	3.3 Terms and definitions
1.2.1 Equipment electrical ratings *Heading only.*	3.3.10 Ratings *Heading only.*
1.2.1.1 RATED VOLTAGE	3.3.10.4 rated voltage *More extensive.*
1.2.1.2 RATED VOLTAGE RANGE	3.3.10.5 rated voltage range *Same*
1.2.1.3 RATED CURRENT	3.3.10.1 rated current *Same*
1.2.1.4 RATED FREQUENCY	3.3.10.2 rated frequency *Same*
1.2.1.5 RATED FREQUENCY RANGE	*No such term, but meaning of the frequency range is included in rated frequency.*
Term not used. See 1.7.1. power rating marking requires rated voltage, rated current and rated frequency.	3.3.10.3 rated power

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.2 Operating conditions	3.3.7 Operating and fault conditions *The definitions for normal operating condition, abnormal operating condition, and single fault condition are different.*
No such defined term.	3.3.7.1 abnormal operating condition Temporary operating condition that is not a normal operating condition and is not a single fault condition of the equipment itself *Abnormal operating condition does not include any fault condition.*
1.2.2.1 NORMAL LOAD	3.3.7.4 normal operating condition *Different term; same definition.*
1.2.2.2 RATED OPERATING TIME	*No such term.*
1.2.2.3 RATED RESTING TIME	*No such term.*
1.2.3 Equipment mobility *Heading only.*	3.3.3 Equipment terms *Heading only. Generalized; not limited to mobility.*
1.2.3.1 MOVABLE EQUIPMENT	3.3.3.3 movable equipment *Same.*
1.2.3.2 HAND-HELD EQUIPMENT	3.3.3.2 hand held equipment *Same.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.3.3 TRANSPORTABLE EQUIPMENT	3.3.3.8 transportable equipment *Similar meaning, but no weight limit.*
1.2.3.4 STATIONARY EQUIPMENT	3.3.3.7 stationary equipment *Different wording, similar meaning.*
1.2.3.5 EQUIPMENT FOR BUILDING-IN	*No such term.*
1.2.3.6 DIRECT PLUG-IN EQUIPMENT	3.3.3.1 direct plug-in equipment *Different wording, similar meaning.*
1.2.4 Classes of equipment – Protection against electric shock *Heading only.*	3.3.15 Classes of equipment with respect to protection from electric shock *Heading only.*
1.2.4.1 CLASS I EQUIPMENT	3.3.15.1 class I equipment *Different wording, same meaning*
1.2.4.2 CLASS II EQUIPMENT	3.3.15.2 class II construction *Newly defined term.*
	3.3.15.3 class II equipment *Different wording, same meaning.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.4.3 CLASS III EQUIPMENT	3.3.15.4 Class III equipment *Different wording, same meaning.*
1.2.5 Connection to the supply	*No equivalent heading.*
1.2.5.1 PLUGGABLE EQUIPMENT TYPE A	3.3.3.5 pluggable equipment type A *Same.*
1.2.5.2 PLUGGABLE EQUIPMENT TYPE B	3.3.3.6 pluggable equipment type B *Same.*
1.2.5.3 PLUGGABLE EQUIPMENT	*No such term. Pluggable equipment is either Type A or Type B.*
1.2.5.4 PERMANENTLY CONNECTED EQUIPMENT	3.3.3.4 permanently connected equipment *Different wording, same meaning.*
1.2.5.5 DETACHABLE POWER SUPPLY CORD	*No such term. Refer to 3.3.6.4 Non-detachable power supply cord.*
1.2.5.6 NON-DETACHABLE POWER SUPPLY CORD	3.3.6.4 non-detachable power supply cord *Different definition, same meaning.*
1.2.6 Enclosures *Heading only.*	3.3.2 Enclosure terms *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.6.1 ENCLOSURE	**3.3.2.2 enclosure** *Different wording, same meaning.*
1.2.6.2 FIRE ENCLOSURE Part of the equipment intended to minimize the spread of fire or flames from within	**3.3.2.3 fire enclosure** **Enclosure** intended as a **safeguard** against the spread of fire from within the **enclosure** to outside the **enclosure** *Re-defined based on hazard-based concept.*
1.2.6.3 MECHANICAL ENCLOSURE	**3.3.2.4 mechanical enclosure** *Different wording, same meaning*
1.2.6.4 ELECTRICAL ENCLOSURE	**3.3.2.1 electrical enclosure** *Different wording, same meaning*
1.2.6.5 DECORATIVE PART Part of the equipment, outside the ENCLOSURE, which has no safety function.	*No such term.* *Based on hazard-based concept: in the absence of hazardous energy, there is no safety function (**safeguard**) and no requirement.*
1.2.7 Accessibility	*No equivalent heading.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.7.1 OPERATOR ACCESS AREA part of the equipment to which, under normal operating conditions, one of the following applies: – access can be gained without the use of a TOOL; – the means of access is deliberately provided to the OPERATOR; – the OPERATOR is instructed to enter regardless of whether or not a TOOL is needed to gain access The terms "access" and "accessible", unless qualified, relate to an OPERATOR ACCESS AREA as defined above.	**3.3.6.1 accessible** touchable by a body part
	Annex V **(normative)** **Determination of accessible parts** **V.1 Accessible parts of equipment** **V.1.1 General** **V.1.2 Test method 1 – Surfaces and openings tested with jointed test probes** **V.1.3 Test method 2 – Openings tested with straight unjointed test probes** **V.1.4 Test method 3 – Plugs, jacks, connectors** **V.1.5 Test method 4 – Slot openings**
No equivalent requirement.	**V.1.6 Test method 5 – Terminals intended to be used by an ordinary person**
No equivalent compliance statement.	**V.2 Accessible part criterion**
1.2.7.2 SERVICE ACCESS AREA	*No such defined term*
1.2.7.3 RESTRICTED ACCESS AREA	**3.3.6.6 restricted access area** *Different wording, same meaning*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.7.4 TOOL	3.3.6.9 tool *Different wording, same meaning*
1.2.7.5 BODY	*No such defined term*
1.2.7.6 SAFETY INTERLOCK	3.3.11.13 safety interlock *Different wording, same meaning*
1.2.8 Circuits and circuit characteristics *Heading only.*	3.3.1 Circuit terms *Heading only.*
1.2.8.1 AC MAINS SUPPLY	3.3.1.2 mains *Difference in the definition of DC mains*
1.2.8.2 DC MAINS SUPPLY	
1.2.8.3 MAINS SUPPLY	
1.2.8.4 PRIMARY CIRCUIT	*No such defined term*
1.2.8.5 SECONDARY CIRCUIT	*No such defined term*
1.2.8.6 HAZARDOUS VOLTAGE	*No such defined term. Included in ES3 definition*
1.2.8.7 ELV CIRCUIT	*No such defined term*
1.2.8.8 SELV CIRCUIT	*No such defined term. Included in ES1 definition*
1.2.8.9 LIMITED CURRENT CIRCUIT	*No such defined term. Included in ES1 definition*
1.2.8.10 HAZARDOUS ENERGY LEVEL	*No such defined term.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.8.11 TNV CIRCUIT	*No such defined term.*
1.2.8.12 TNV-1 CIRCUIT	*No such defined term. Included in ES1 definition*
1.2.8.13 TNV-2 CIRCUIT	*No such defined term. Included in ES2 definition*
1.2.8.14 TNV-3 CIRCUIT	*No such defined term. Included in ES2 definition*
No such defined term. An external circuit is described by its characteristics, such as TNV-1/2/3, telecommunication wiring system, and cable distribution system	3.3.1.1 external circuit *Generalized term. Includes TNV circuits, antenna circuits, etc.*
1.2.9 Insulation *Heading only.*	3.3.5 Insulation *Heading only.*
1.2.9.1 FUNCTIONAL INSULATION	3.3.5.3 functional insulation *Same*
1.2.9.2 BASIC INSULATION	3.3.5.1 basic insulation *Same*
1.2.9.3 SUPPLEMENTARY INSULATION	3.3.5.6 supplementary insulation *Same.*
1.2.9.4 DOUBLE INSULATION	3.3.5.2 double insulation *Same.*
1.2.9.5 REINFORCED INSULATION	3.3.5.4 reinforced insulation *Same.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.9.6 WORKING VOLTAGE	3.3.14.10 working voltage *Different wording, same meaning*
1.2.9.7 RMS WORKING VOLTAGE	3.3.14.8 r.m.s. working voltage *Different wording, same meaning*
1.2.9.8 PEAK WORKING VOLTAGE	3.3.14.4 peak working voltage *Same.*
1.2.9.9 REQUIRED WITHSTAND VOLTAGE	3.3.14.7 required withstanding voltage *Same.*
1.2.9.10 MAINS TRANSIENT VOLTAGE	3.3.14.2 mains transient voltage *Same.*
1.2.9.11 TELECOMMUNICATION NETWORK TRANSIENT VOLTAGE	*No such defined term. Transient voltage is taken into account in requirements for **external circuits**.*
1.2.10 Properties of insulation	*No equivalent heading.*
No equivalent heading.	3.3.12 Spacings
1.2.10.1 CLEARANCE	3.3.12.1 clearance *Different wording, same meaning*
1.2.10.2 CREEPAGE DISTANCE	3.3.12.2 creepage distance *Different wording, same meaning*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.10.3 BOUNDING SURFACE *This definition is used in 2.10.3.1.*	5.4.1.10 Insulating surfaces *No such defined term. However, 5.4.1.10 describes the concept.*
1.2.10.4 SOLID INSULATION	3.3.5.5 solid insulation *Different wording, same meaning*
1.2.11 Components	*No equivalent heading.*
No equivalent heading.	3.3.13 Temperature and controls
No such defined term	3.3.13.1 highest charging temperature
No such defined term	3.3.13.2 lowest charging temperature
1.2.11.1 THERMOSTAT	3.3.13.5 thermostat *Different wording, same meaning*
1.2.11.2 TEMPERATURE LIMITER	3.3.13.3 temperature limiter *Different wording, same meaning*
1.2.11.3 THERMAL CUT-OUT	3.3.13.4 thermal cut-off *Different wording, same meaning*
1.2.11.4 THERMAL CUT-OUT, AUTOMATIC RESET	*No such defined term. Included in **thermal cut-off***
1.2.11.5 THERMAL CUT-OUT, MANUAL RESET	*No such defined term. Included in **thermal cut-off***

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.11.6 INTERCONNECTING CABLE	*No such defined term*
1.2.12 Flammability *Heading only.*	3.3.4 Flammability terms *Heading only.*
No such defined term.	3.3.4.1 Combustible material Organic material, capable of combustion

<table>
<tr><th>IEC 60950-1 Second edition, 2005-12 and Amendment 1</th><th>IEC 62368-1 Edition 1.0, 2010-01</th></tr>
<tr><td>

1.2.12.1 FLAMMABILITY CLASSIFICATION OF MATERIALS

Recognition of the burning behaviour of materials and their ability to extinguish if ignited

Table 1B Equivalence of flammability classes

<table>
<tr><th>Old class</th><th>New class</th><th>Equivalence</th></tr>
<tr><td>–</td><td>5VA (1.2.12.5)</td><td>5VA is not required in this standard.</td></tr>
<tr><td>5V</td><td>5VB (1.2.12.6)</td><td>Materials that pass the tests for class 5V in clause A.9 of earlier editions of this standard are equivalent to 5VB or better.</td></tr>
<tr><td rowspan="2">HB</td><td>HB40 (1.2.12.10)</td><td>Samples of materials in a thickness of 3 mm that pass the tests of clause A.8 in earlier editions of this standard (maximum burning rate 40 mm/min during test) are equivalent to HB40.</td></tr>
<tr><td>HB75 (1.2.12.11)</td><td>Samples of materials in a thickness of less than 3 mm that pass the tests of clause A.8 in earlier editions of this standard (maximum burning rate 75 mm/min during test) are equivalent to HB75.</td></tr>
</table>

</td><td>

3.3.4.2 Material flammability class

Same definition

S.4 Flammability classification of materials

Same

Table S.1 – Foamed materials

<table>
<tr><th>Material flammability class</th><th>ISO standard</th></tr>
<tr><td>HF-1 regarded better than HF-2</td><td>9772</td></tr>
<tr><td>HF-2 regarded better than HBF</td><td>9772</td></tr>
<tr><td>HBF</td><td>9772</td></tr>
</table>

Table S.2 – Rigid materials

<table>
<tr><th>Material flammability class</th><th>IEC standard</th></tr>
<tr><td>5VA regarded better than 5VB</td><td>60695-11-20</td></tr>
<tr><td>5VB regarded better than V-0</td><td>60695-11-20</td></tr>
<tr><td>V-0 regarded better than V-1</td><td>60695-11-10</td></tr>
<tr><td>V-1 regarded better than V-2</td><td>60695-11-10</td></tr>
<tr><td>V-2 regarded better than HB40</td><td>60695-11-10</td></tr>
<tr><td>HB40 regarded better than HB75</td><td>60695-11-10</td></tr>
<tr><td>HB75</td><td>60695-11-10</td></tr>
</table>

Table S.3 – Very thin materials

<table>
<tr><th>Material flammability class</th><th>ISO standard</th></tr>
<tr><td>VTM-0 regarded better than VTM-1</td><td>9773</td></tr>
<tr><td>VTM-1 regarded better than VTM-2</td><td>9773</td></tr>
<tr><td>VTM-2</td><td>9773</td></tr>
<tr><td></td><td></td></tr>
</table>

</td></tr>
<tr><td>

1.2.12.2 V-0 class material

</td><td>

3.3.4.2.8 V-0 class material

Same

</td></tr>
</table>

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.12.3 V-1 class material	3.3.4.2.9 V-1 class material *Same*
1.2.12.4 V-2 class material	3.3.4.2.10 V-2 class material *Same*
1.2.12.5 5VA class material	3.3.4.2.1 5VA class material *Same*
1.2.12.6 5VB class material	3.3.4.2.2 5VB class material *Same*
1.2.12.7 HF-1 class foamed material	3.3.4.2.6 HF-1 class foamed material *Same*
1.2.12.8 HF-2 class foamed material	3.3.4.2.7 HF-2 class foamed material *Same*
1.2.12.9 HBF class foamed material	3.3.4.2.5 HBF class foamed material *Same*
1.2.12.10 HB40 class material	3.3.4.2.3 HB40 class material *Same*
1.2.12.11 HB75 class material	3.3.4.2.4 HB75 class material *Same*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.12.12 VTM-0 class material	3.3.4.2.11 VTM-0 class material *Same*
1.2.12.13 VTM-1 class material	3.3.4.2.12 VTM-1 class material *Same*
1.2.12.14 VTM-2 class material	3.3.4.2.13 VTM-2 class material *Same*
1.2.12.15 Explosion limit	*No such defined term*
No such defined term	3.3.16.2 Explosion
No such defined term	3.3.16.3 Explosive
1.2.13 Miscellaneous *Heading only.*	3.3.6 Miscellaneous *Heading only.*
No such defined term	3.3.6.5 pollution degree
1.2.13.1 TYPE TEST	3.3.6.11 type test *Same.*
1.2.13.2 SAMPLING TEST	3.3.6.8 sampling test *Same.*
1.2.13.3 ROUTINE TEST	3.3.6.7 routine test *Same.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No such defined term	3.3.7.2 intermittent operation
No such defined term	3.3.7.3 non-clipped output power
No such defined term, However refer to 5.3.1	3.3.7.5 overload condition
No such defined term	3.3.7.6 peak response frequency
No such defined term. However, refer to 5.3.7.	3.3.7.7 rated load impedance
No such defined term. However, refer to 0.1 and 5.3.1	3.3.7.8 reasonably foreseeable misuse
No such defined term	3.3.7.9 short-time operation
No such defined term. However, refer to 1.3.2.	3.3.7.10 single fault condition
No equivalent heading.	3.3.14 Voltages and currents
1.2.13.4 DC VOLTAGE	3.3.14.1 d.c. voltage *Same.*
No such defined term.	3.3.14.3 maximum charging current
No such defined term.	3.3.14.5 prospective touch voltage
No such defined term.	3.3.14.9 upper limit charging voltage
No equivalent heading.	3.3.8 Persons

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No such defined term.	3.3.8.1 instructed person
1.2.13.5 SERVICE PERSON	3.3.8.3 skilled person *Different wording, same meaning.*
1.2.13.6 USER	3.3.8.2 ordinary person *Different wording, same meaning.*
1.2.13.7 OPERATOR	*No such defined term. See "**ordinary person**," 3.3.8.2.*
1.2.13.8 TELECOMMUNICATION NETWORK	*No such defined term. See "**external circuit**," 3.3.1.1.*
1.2.13.9 FUNCTIONAL EARTHING	*No such defined term. Functional earthing is not a **safeguard**.*
1.2.13.10 PROTECTIVE EARTHING CONDUCTOR	3.3.11.10 protective earthing conductor *Different wording, same meaning.*
1.2.13.11 PROTECTIVE BONDING CONDUCTOR	3.3.11.8 protective bonding conductor *Same*
No such defined term.	3.3.11.9 protective conductor *Newly defined term. **Protective conductor** is either a **protective earthing conductor** or a **protective bonding conductor**.*
1.2.13.12 TOUCH CURRENT	3.3.6.10 touch current *Same meaning.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.2.13.13 PROTECTIVE CONDUCTOR CURRENT	3.3.14.6 protective conductor current *Same.*
1.2.13.14 CABLE DISTRIBUTION SYSTEM	*No such term. Included in External circuit.*
1.2.13.15 CHEESECLOTH	3.3.6.2 cheesecloth *Same.*
Term not defined (refer to 1.7.2.2)	3.3.6.3 disconnect device
1.2.13.16 WRAPPING TISSUE	3.3.6.12 wrapping tissue *Different wording, same meaning.*
1.2.13.17 PROTECTIVE CURRENT RATING	3.3.10.6 protective current rating *Different wording, same meaning.*
No equivalent heading.	3.3.9 Potential ignition sources
No such term.	3.3.9.1 potential ignition source, PIS
No such term.	3.3.9.2 arcing PIS
No such term.	3.3.9.3 resistive PIS
No such term.	3.3.11 Safeguards
No such term.	3.3.11.1 basic safeguard

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No such term.	3.3.11.2 double safeguard
No such term.	3.3.11.3 equipment safeguard
No such term.	3.3.11.4 installation safeguard
No such term.	3.3.11.5 instructional safeguard
No such term.	3.3.11.6 personal safeguard
No such term.	3.3.11.7 precautionary safeguard
No such term.	3.3.11.11 reinforced safeguard
Term not defined.	3.3.11.12 safeguard
No such term.	3.3.11.14 skill safeguard
No such term.	3.3.11.15 supplementary safeguard
No equivalent heading.	3.3.16 Chemical terms
No such term.	3.3.16.1 consumable material
No such term.	3.3.16.4 hazardous chemical
No such term.	3.3.16.5 Personal protective equipment PPE

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.3 General requirements	4 General requirements 4.1 General
No equivalent statements.	4.1.1 Application of requirements and acceptance of materials, components and subassemblies
1.3.1 Application of requirements The requirements detailed in this standard shall be applied only if safety is involved. In order to establish whether or not safety is involved, the circuits and construction shall be carefully investigated to take into account the consequences of possible failures.	B.1.2 Test applicability If it is evident that a particular test is not applicable or not necessary after inspection of available data, the test shall not be made. Tests in this standard shall be conducted only if safety is involved. In order to establish whether or not a test is applicable, the circuits and construction shall be carefully investigated to take into account the consequences of possible faults. The consequence of a fault may or may not require the use of a **safeguard** to reduce the likelihood of injury or fire.
1.3.2 Equipment design and construction	4.1.3 Equipment design and construction *Same except "protection" is replaced by "**safeguard**." Accessibility requirement added. Control adjustment requirement added.*
1.3.3 Supply voltage Equipment shall be designed to be safe at any supply voltage to which it is intended to be connected.	B.2.1 General *Requirement is a test requirement in B.2.1.*
No equivalent statements.	4.1.4 Equipment installation The equipment evaluation according to this standard shall take into account manufacturer's instructions with regard to installation, relocation, servicing and operation, as applicable.

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.3.4 Constructions not specifically covered	4.1.5 Constructions not specifically covered *Same except "a level of safety" is replaced by "**safeguards**."*
1.2.12. Flammability, Table 1B 1.3.5 Equivalent materials	Annex S.4 *No differences. Equivalent materials are specified in Tables S.1, S.2, and S.3.*
1.3.6 Orientation during transport and use	4.1.6 Orientation during transport and use *Same.*
1.3.7 Choice of criteria	4.1.7 Choice of criteria *Same.*
1.3.8 Examples mentioned in the standard	4.1.13 Examples mentioned in the standard *Same*
1.3.9 Conductive liquids	4.1.8 Conductive liquids *Same*
1.4 General conditions for tests	Annex B (normative) Normal operating condition tests, abnormal operating condition tests and single fault condition tests B.1.1 General *This annex specifies various tests and test conditions applicable to the equipment.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.4.1 Application of tests	B.1.2 Test applicability *Essentially the same, but guidance is given on selection of tests based on the consequences of possible faults.*
1.4.2 Type tests	B.1.3 Type of test *Same*
1.4.3 Test samples	B.1.4 Test samples *No significant differences.*
	4.1.14 Tests on parts or samples separate from the end-product If a test is conducted on a part or sample separate from the end-product, the test shall be conducted as if the part or sample was in the end product.
1.4.4 Operating parameters for tests	B.2.1 General *Modified requirement is that tests are specifically conducted under normal operating conditions taking into account environmental conditions (for example, the manufacturer's rated maximum ambient temperature).*
1.4.5 Supply voltage for tests	B.2.3 Supply voltage *No significant differences.*
1.4.6 Supply frequency for tests	B.2.2 Supply frequency *Same.*
1.4.7 Electrical measuring instruments	4.1.9 Electrical measuring instruments *No significant differences.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.4.8 Normal operating voltages	**B.2.4 Normal operating voltages** *No significant differences.*
1.4.9 Measurement of voltage to earth	**B.1.5 Measurement of voltages to earth** *No significant differences.*
1.4.10 Loading configuration of the EUT	**B.2.5 Input test** *Adds loading due to audio output and moving images (video).*
1.4.11 Power from a telecommunication network For the purpose of this standard, the power available from a TELECOMMUNICATION NETWORK is considered to be limited to 15 VA.	**6.2.2.4 PS1** For the purpose of this standard, the power available from **external circuits** described in Table 16, ID numbers 11, 12, 13 and 14, are considered to be PS1. *This standard generalizes the requirements to apply to all external circuits including telecommunication network circuits.* *A PS1 circuit is limited to 15 watts. Power, rather than VA, is a measure of heating of a circuit component.*
1.4.12 Temperature measurement conditions	*No equivalent heading.*
1.4.12.1 General	**B.2.6 Operating temperature measurement conditions** *Heading only.*
	B.2.6.1 General *No significant difference.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.4.12.2 Temperature dependent equipment	4.1.10 Temperature measurements Unless stated otherwise, where the result of a test is likely to depend upon the ambient temperature, the manufacturer's specified ambient temperature range of the equipment (Tma) shall be taken into account.
	B.2.6.2 Operating temperature dependent heating/cooling *No differences.*
1.4.12.3 Non-temperature dependent equipment	B.2.6.3 Operating temperature independent heating/cooling *No differences.*
1.4.13 Temperature measurement methods	4.1.11 Steady state conditions *New.* Steady state conditions are those conditions when thermal equilibrium is considered to exist (see B.1.7).
	B.1.7 Temperature measurement conditions Unless a particular method is specified, temperatures of windings shall be determined either by the thermocouple method or by any other method giving the average temperature of the winding wires such as the resistance method.
No equivalent heading.	4.1.12 Hierarchy of safeguards

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.4.14 Simulated faults and abnormal conditions	**B.3 Simulated abnormal operating conditions** *B.3 identifies abnormal operating conditions under which the specified tests must be performed. Note that abnormal operating conditions are not single fault conditions. Under abnormal operating condition, the equipment may be functional; the equipment does not have a fault of any component. Upon removal of the abnormal operating condition, the equipment resumes normal operating condition. An abnormal operating condition may lead to a single fault condition, in which case the abnormal operating condition tests do not apply.*
No equivalent heading.	**B.3.1 General** *An example of an abnormal operating condition is a paper jam. Amplifier controls are added.*
No equivalent heading.	**B.4 Simulated single fault conditions**
No equivalent statements.	**B.4.1 General** *Abnormal operating conditions and (simulated) single fault conditions are separate tests. See definitions 3.3.7.1 and 3.3.7.10.*
1.4.15 Compliance by inspection of relevant data	**B.1.6 Compliance by inspection of relevant data** *Same*
	4.1.1 Application of requirements and acceptance of materials, components and subassemblies Components and 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.

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.5 Components *Heading only.*	**G Components** *Heading only.*
1.5.1 General	**4.1.2 Use of components** *No significant differences.*
1.5.2 Evaluation and testing of components	
1.5.3 Thermal controls Thermal controls shall be tested in accordance with Annex K.	**G.2 Thermal cut-offs** *Heading only.*
	G.2.1 Requirements for thermal cut-offs **G.2.2 Test method** **G.2.3 Compliance** *Thermal cut-off requirements are extensively revised and include new requirements.*
1.5.4 Transformers Transformers shall comply with the relevant requirements of this standard, including those of Annex C.	**G.7 Transformers** *Heading only.*
	G.7.1 General *Transformer requirements are extensively revised and include new requirements.*
1.5.5 Interconnecting cables	*No equivalent requirements, but the concept is included in 4.1.2 Use of components*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.5.6 Capacitors bridging insulation	*No requirements for X capacitors. An X capacitor is not a safeguard against electric shock.*
	G.15 Capacitors and RC units serving as safeguards bridging insulation *Heading only.*
	G.15.1 General *Introduction to G.15.*
	G.15.2 Conditioning of capacitors and RC units *Different wording, same meaning.*
No equivalent information.	G.15.4 Informative examples of the application of capacitors
1.5.7 Resistors bridging insulation *Heading only.*	5.5.2.7 Resistors as a basic safeguard and a supplementary safeguard G.14 Test for resistors serving as safeguard G.14.1 General
1.5.7.1 Resistors bridging functional insulation, basic insulation or supplementary insulation	*No requirements for bridging functional insulation. Requirements for bridging basic or supplementary insulation are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.5.7.2 Resistors bridging double insulation or reinforced insulation between the a.c. mains supply and other circuits	5.5.3 Components as a reinforced safeguard 5.5.3.1 General requirements
	5.5.3.6 Resistors *Requirements are similar.*
	G.14.2 Resistor test *Same.*
1.5.7.3 Resistors bridging double insulation or reinforced insulation between the a.c. mains supply and circuits connected to an antenna or coaxial cable	5.5.3 Components as a reinforced safeguard
	5.5.4 Insulation between the mains and an external circuit consisting of a coaxial cable *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	G.14.3 Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable *Heading only.* **G.14.3.1 General** *New requirement.* **G.14.3.2 Voltage surge test** *New requirement.* **G.14.3.3 Impulse test** *New requirement.* **G.14.3.4 Compliance** *New requirement.*
No equivalent statements.	**5.5.3.2 Capacitors and RC units**
No equivalent statements.	**5.5.3.3 Transformers**
No equivalent statements.	**5.5.3.4 Optocouplers**
No equivalent statements.	**5.5.3.5 Relays**
1.5.8 Components in equipment for IT power distribution systems	*Requirements for components and equipment for use on IT power distribution systems are specified in various sub-clauses. For example, see 5.5.2.2, Note 3, and L.1.4 and L.1.5.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.5.9 Surge suppressors *Heading only.*	**5.5.2.8 SPD as a basic safeguard** *SPD means Surge Protective Device. See 3.2.2, Abbreviations in alphabetical order.* An SPD may be used as a basic safeguard provided that one side of the SPD is earthed according to 5.6.8.2. A MOV used as a basic safeguard shall comply with the requirements of Clause G.10.
1.5.9.1 General It is permitted to use any type of surge suppressor, including a voltage dependent resistor (VDR), in a SECONDARY CIRCUIT. If a surge suppressor is used in a PRIMARY CIRCUIT, it shall be a VDR and it shall comply with Annex Q.	
1.5.9.2 Protection of VDRs	**G.10 Metal Oxide Varistors** *Heading only.*
	G.10.1 General NOTE 1 An MOV is sometimes referred to as a VDR. *New requirements for MOVs connected between mains and earth.*
	G.10.2 Basic safeguard This subclause specifies requirements for a MOV that serves as a basic safeguard against fire or electric shock.
1.5.9.3 Bridging of functional insulation by a VDR	*No requirement because functional insulation is not a **safeguard**.*
1.5.9.4 Bridging of basic insulation by a VDR	**5.5.2.8 SPD as a basic safeguard** *Similar requirement.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.5.9.5 Bridging of supplementary, double or reinforced insulation by a VDR It is not permitted to bridge SUPPLEMENTARY INSULATION, DOUBLE INSULATION or REINFORCED INSULATION by a VDR.	**G.10.3 Supplementary safeguard** This subclause specifies supplementary safeguards to be provided against fire resulting from both sudden and gradual failure of an MOV connected directly across the mains or between mains and protective earth (see 5.6.8.2).
No equivalent statements.	**5.5 Components as safeguards** *Heading only.* **5.5.1 General**
No equivalent statements.	**5.5.2.2 Capacitors and RC units as a basic safeguard and a supplementary safeguard**
No equivalent statements.	**5.5.2.5 Optocouplers as basic safeguard and supplementary safeguard**
No equivalent statements.	**5.5.2.6 Relays as a basic safeguard and a supplementary safeguard**
No equivalent statements.	**5.5.2.9 Other components as a basic safeguard between ES1 and ES2**
No equivalent statements.	**5.5.5 Components and parts that may bridge insulation** *Heading only.* **5.5.5.1 Requirement** **5.5.5.2 Compliance**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.6 Power interface *Heading only.*	*AC power distribution systems are not defined. Equipment requirements are, for the most part, independent of the AC power distribution system characteristics.*
1.6.1 AC power distribution system	
1.6.2 Input current	**B.2.5 Input test** *The input current or input power is determined by test. Parameters affecting the input current or power are specified and maximized. The measured input current or power is compared with the rated input current or power.*
1.6.3 Voltage limit of hand-held equipment	*No requirements for limiting the supply voltage of hand-held equipment.*
1.6.4 Neutral conductor The neutral conductor, if any, shall be insulated from earth and from the BODY throughout the equipment as if it were a line conductor. Components connected between neutral and earth shall be rated for the line-to-neutral voltage (however, see also 1.5.8).	**4.2.4 Energy source classification by declaration** A neutral conductor is declared a class 3 electrical energy source. A neutral conductor must comply with the same requirements as a line *conductor*.
1.7 Markings and instructions *Heading only.*	**Annex F** **(normative)** **Equipment markings, instructions, and instructional safeguards** *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	F.1 General This annex specifies equipment markings, equipment instructions, and instructional safeguards necessary for equipment installation, operation, maintenance, and servicing in accordance with the requirements of this standard.
1.7.1 Power rating Equipment shall be provided with a power rating marking, the purpose of which is to specify a supply of correct voltage and frequency, and of adequate current-carrying capacity. *No compliance statement.*	**F.3 Equipment markings** *Heading only.*
	F.3.1 Equipment marking locations *Requirements are similar.*
	F.3.2 Equipment identification markings *Heading only.*
	F.3.2.1 Manufacturer identification *Requirements are similar.*
	F.3.2.2 Model identification *Requirements are similar.*
	F.3.2.3 Compliance *New.*
	F.3.3 Equipment rating markings *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	F.3.3.1 Equipment without direct connection to mains *Requirements are similar.*
	F.3.3.2 Nature of the supply voltage *Requirements are similar.*
	F.3.3.3 Rated voltage *No equivalent heading.*
	F.3.3.4 Rated frequency *Requirements are similar.*
	F.3.3.5 Rated current or rated power *Requirements are similar.*
	F.3.6.2 Class II equipment *Requirements are similar.*
	F.3.6.3 Compliance *New requirement.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.7.2 Safety instructions and marking *Heading only.*	**4.1.15 Markings and instructions** *A requirement for a specific safety instruction or marking is specified in the relevant sub-clause. Annex F specifies the general requirements for safety instructions and markings.*
1.7.2.1 General Sufficient information shall be provided to the USER concerning any condition necessary to ensure that, when used as prescribed by the manufacturer, the equipment is unlikely to present a hazard within the meaning of this standard. If it is necessary to take special precautions to avoid the introduction of hazards when operating, installing, servicing, transporting or storing equipment, the necessary instructions shall be made available.	
7.2.1 General NOTE 3 In many countries, instructions and equipment marking related to safety are required to be in a language that is acceptable in the country in which the equipment is to be installed. Servicing instructions are normally made available only to SERVICE PERSONS and are generally acceptable in the English language only.	**F.1 General** Unless symbols are used, safety related equipment marking instructions and instructional safeguards must be in a language accepted in the respective countries. *The requirement for national language support is provided in the body part, not as a note.*
1.7.2.2 Disconnect devices Where the disconnect device is not incorporated in the equipment (see 3.4.3) or where the plug on the power supply cord is intended to serve as the disconnect device, the installation instructions shall state that:	**L.1.2 Permanently connected equipment** For permanently connected equipment the disconnect device shall be incorporated in the equipment, unless the equipment is accompanied by installation instructions stating that an appropriate disconnect device shall be provided as part of the building installation.

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
- for PERMANENTLY CONNECTED EQUIPMENT, a readily accessible disconnect device shall be incorporated external to the equipment; - for PLUGGABLE EQUIPMENT, the socket-outlet shall be installed near the equipment and shall be easily accessible.	**L.1.7 Plugs as disconnect devices** Where a plug on the power supply cord is used as the disconnect device, the installation instructions shall state that for pluggable equipment, the socket-outlet shall be easily accessible. For pluggable equipment intended for installation by an ordinary person, the installation instructions shall be made available to the ordinary person. *Different wording, same meaning.*
1.7.2.3 Overcurrent protective devices For PLUGGABLE EQUIPMENT TYPE B or PERMANENTLY CONNECTED EQUIPMENT, the installation instructions shall specify the maximum rating of an overcurrent protective device to be provided external to the equipment, unless there are appropriate overcurrent protective devices in the equipment [see also 2.6.3.3 b)].	**5.6.6.3 Size of protective bonding conductors and terminals** For pluggable equipment type B, and permanently connected equipment the protective current rating is the maximum rating of the overcurrent protective device specified in the equipment installation instructions to be provided external to the equipment. *No specific requirement for the installation instructions to include the maximum rating of an external (installation) overcurrent protective device. 5.6.6.3 implies that such an instruction is required.*
1.7.2.4 IT power distribution systems If the equipment has been designed or, when required, modified for connection to an IT power distribution system, the equipment installation instructions shall so state.	*No requirement for identifying that the equipment is acceptable for connection to an IT power distribution system.*
1.7.2.5 Operator access with a tool If a TOOL is necessary to gain access to an OPERATOR ACCESS AREA, either all other compartments within that area containing a hazard shall be inaccessible to the OPERATOR by the use of the same TOOL, or such compartments shall be marked to discourage OPERATOR access.	*The need to use alternate fasteners or an instructional safeguard against access is specified in the relevant sub-clause.*
1.7.2.6 Ozone	**7.3 Ozone exposure** *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.7.3 Short duty cycles	3.3.7.9 short-time operation *Requirements are similar.*
1.7.4 Supply voltage adjustment	F.3.4 Voltage setting device *Requirements are similar.*
1.7.5 Power outlets on the equipment	F.3.5 Terminals and operating devices *Heading only.*
	F.3.5.1 Mains appliance outlet and socket-outlet markings *Requirements are similar.*
No equivalent requirement.	F.3.5.2 Switch position identification marking The position of a disconnect switch or circuit-breaker shall be identified. Such identification may be comprised of words, symbols, or an illuminated indicator.
1.7.6 Fuse identification *No compliance is statement.*	F.3.5.3 Replacement fuse identification and rating markings *Requirements are similar.*
	F.3.5.5 Compliance *New.*
1.7.7 Wiring terminals	*No equivalent sub-clause.*
1.7.7.1 Protective earthing and bonding terminals	F.3.6 Equipment markings related to equipment classification *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	F.3.6.1 Class I equipment *Heading only.*
	F.3.6.1.1 Protective earthing conductor terminal *Requirements are similar.*
1.7.7.2 Terminals for a.c. mains supply conductors	**F.3.6.1.2 Neutral conductor terminal** *Requirements are similar.*
	F.3.6.1.3 Protective bonding conductor terminals *Requirements are similar.*
	F.3.6.1.4 Terminal marking location *Requirements are similar. No requirements for identifying terminals for phase sequence.*
1.7.7.3 Terminals for d.c. mains supply conductors	**F.3.6.1.4 Terminal marking location** *Requirements for terminal identification, F.3.6.1.4, apply to both a.c. and d.c.*
1.7.8 Controls and indicators *Heading only.*	*No equivalent heading.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.7.8.1 Identification, location and marking Unless it is obviously unnecessary, indicators, switches and other controls affecting safety shall be identified or located so as to indicate clearly which function they control. Markings and indications for switches and other controls shall be located either: - on or adjacent to the switch or control, or - elsewhere, provided that it is obvious to which switch or control the marking applies.	**4.1.3 Equipment design and construction** For an ordinary person or an instructed person, the adjustment of a control shall not defeat an equipment safeguard. *Under normal or abnormal operating conditions, a disconnect switch as well as other controls may be considered a basic safeguard. Under single fault conditions, a disconnect switch or other controls may be consider a supplementary safeguard.* *Markings for a control may be required if the control provides a supplementary safeguard function. A requirement for a specific instruction or marking is specified in the relevant sub-clause. Functional controls are not required to be marked or identified.*
1.7.8.2 Colours	**F.3.8 Durability, legibility and permanence of markings** *Colours for markings and symbols are not specified. However, if colour is used, it shall be in accordance with ISO 3864 rather than IEC 60073. Specifications for some standard graphical symbols may include colours.*
1.7.8.3 Symbols	**F.2 Letter symbols and graphical symbols** **F.2.1 Letter symbols** **F.2.2 Graphical symbols** **F.2.3 Compliance** *Requirements are similar.*
1.7.8.4 Markings using figures	*No equivalent sub-clause.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.7.9 Isolation of multiple power sources	F.3.3.6 Equipment with multiple supply connections *Requirements are similar.*
	F.3.3.7 Compliance *New.*
1.7.10 Thermostats and other regulating devices	*No equivalent sub-clause. See 4.1.3.*
1.7.11 Durability	F.3.8 Durability, legibility and permanence of markings F.3.9 Test for the permanence of markings F.3.9.1 General F.3.9.2 Testing procedure F.3.9.3 Petroleum spirit F.3.9.4 Compliance *Same requirements. Organization is in accordance with the format.*
1.7.12 Removable parts	F.3.1 Equipment marking locations *Requirements are similar.*
1.7.13 Replaceable batteries If an equipment is provided with a replaceable battery, and if replacement by an incorrect type could result in an explosion (for example, with some lithium batteries), the following applies:	F.3.5.4 Replacement battery identification marking *Requirements are similar. However, the marking is required whether or not an explosion could occur.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
1.7.14 Equipment for restricted access locations	**F.4 Instructions** *Requirements are similar. In addition, a similar requirement applies to equipment for use in locations where children are not likely to be present.*
No equivalent requirement or sub-clause.	**F.5 Instructional safeguards** *New requirement. A warning is considered a safeguard that is implemented by the action of a person. The instructional safeguard instructs the person to take specific actions so as to avoid pain or injury.* *This annex specifies the composition of an instructional safeguard.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent statements.	**4.2 Energy source classifications** *This sub-clause describes the three energy source classifications.* **4.2.1 Class 1 energy source** **4.2.2 Class 2 energy source** **4.2.3 Class 3 energy source** **4.2.4 Energy source classification by declaration** **4.3 Protection against energy sources** *This sub-clause specifies protection requirements for ordinary persons, instructed persons, and skilled persons.* **4.3.1 General** **4.3.2 Safeguards for protection of an ordinary person** **4.3.2.1 Safeguards between a class 1 energy source and an ordinary person** **4.3.2.2 Safeguards between a class 2 energy source and an ordinary person** **4.3.2.3 Safeguards between a class 2 energy source and an ordinary person during ordinary person servicing conditions** **4.3.2.4 Safeguards between a class 3 energy source and an ordinary person** **4.3.3 Protection of an instructed person** **4.3.3.1 Safeguards between a class 1 energy source and an instructed person**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	4.3.3.2 Safeguards between a class 2 energy source and an instructed person 4.3.3.3 Safeguards between a class 3 energy source and an instructed person 4.3.4 Protection of a skilled person 4.3.4.1 Safeguards between a class 1 energy source and a skilled person 4.3.4.2 Safeguards between a class 2 energy source and a skilled person 4.3.4.3 Safeguards between a class 3 energy source and a skilled person 4.3.4.4 Safeguards between class 3 energy sources and a skilled person during equipment servicing conditions 4.3.5 Safeguards in a restricted access area 4.4 Safeguards *This sub-clause specifies composition, accessibility, and robustness requirements for safeguards.* 4.4.1 General 4.4.2 Equivalent materials or components 4.4.3 Composition of a safeguard 4.4.4 Accessible parts of a safeguard 4.4.4.1 General 4.4.4.2 Accessible parts of a basic safeguard

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	4.4.4.3 Accessible parts of supplementary and reinforced safeguards 4.4.5 Safeguard robustness 4.4.6 Air comprising a safeguard 4.5 Explosion *This sub-clause specifies requirements that reduce the likelihood of explosion.* 4.5.1 General 4.5.2 Requirements 4.5.3 Compliance
2. Protection from hazards *Heading only.*	5 Electrically-caused injury *Heading only.*
2.1 Protection from electric shock and energy hazards *Heading only.*	
No equivalent statements.	5.2 Classification and limits of electrical energy sources 5.2.1 Electrical energy source classifications 5.2.1.1 ES1 5.2.1.2 ES2 5.2.1.3 ES3 5.2.2.7 Audio signals

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.1.1 Protection in operator access areas This subclause specifies requirements for protection against electric shock from energized parts based on the principle that the OPERATOR is permitted to have access to: SELV circuits; Limited Current circuits, and TNV circuits under the conditions specified in 2.1.1.1. *Access to everything else is specified in 2.1.1.1.* *Protection against energy hazards are specified in 2.1.1.5 and 2.1.1.8.*	**5.3.6 Accessibility to electrical energy sources and safeguards** **5.3.6.1 Requirements** For ordinary persons, the following shall not be accessible: - bare parts at ES2, except for the pins of connectors. However, such pins shall not be accessible under normal operating conditions by the blunt probe of Figure V.3; and - bare parts at ES3; and - an ES3 basic safeguard. For instructed persons, the following shall not be accessible: - bare parts at ES3; and - an ES3 basic safeguard. *No equivalent requirements against energy hazards.*
2.1.1.1 Access to energized parts	**5.3.6.1 Compliance** *Requirements are equivalent. Reference to Annex T, followed by the tests of Annex V.*
No equivalent statements.	**5.3.2 Protection of an ordinary person** **5.3.2.1 Safeguards between ES1 and an ordinary person** **5.3.2.2 Safeguards between ES2 and an ordinary person** **5.3.2.3 Safeguards between ES3 and an ordinary person**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent statements.	**5.3.3 Protection of an instructed person** *Heading only.* **5.3.3.1 Safeguards between ES1 or ES2 and an instructed person** **5.3.3.2 Safeguards between ES3 and an instructed person**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.1.1.1 Access to energised parts The equipment shall be so constructed that in OPERATOR ACCESS AREAS there is adequate protection against contact with: • bare parts of ELV CIRCUITS; and • bare parts at HAZARDOUS VOLTAGES; and • SOLID INSULATION providing FUNCTIONAL INSULATION or BASIC INSULATION of parts or wiring in ELV CIRCUITS, except as permitted in 2.1.1.3; and • SOLID INSULATION providing functional insulation or basic insulation of parts or wiring at hazardous voltages; and • unearthed conductive parts separated from ELV CIRCUITS or from parts at HAZARDOUS VOLTAGES by FUNCTIONAL INSULATION or BASIC INSULATION only; and • bare parts of TNV CIRCUITS, except that access is permitted to: • contacts of connectors that cannot be touched by the test probe (Figure 2C); • bare conductive parts in the interior of a battery compartment that complies with 2.1.1.2; • bare conductive parts of TNV-1 CIRCUITS that have any point connected in accordance with 2.6.1 d) to a protective earthing terminal; • bare conductive parts of connectors in TNV-1 CIRCUITS that are separated from unearthedaccessible conductive parts of the equipment in accordance with 6.2.1.	*Organization is different. Similar requirements throughout Clause 5.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent test probe.	Figure V.1 – Jointed test probe for equipment likely to be accessible to children *Figure V.1 is a new probe to determine accessibility by children.*
Figure 2A – Test finger	Figure V.2 – Jointed test probe for equipment not likely to be accessible to children *Equivalent.*
Figure 2B – Test pin	*No test pin to determine access to hazardous voltages.*
Figure 2C – Test probe	Figure V.3 – Blunt probe *Equivalent.*
Figure 2D - Accessibility of internal conductive parts	**5.3.6.2 Contact requirements** Figure 31 – Contact requirements to bare internal conductive parts *Equivalent.*
2.1.1.2 Battery compartments Access by an OPERATOR to bare conductive parts of TNV CIRCUITS within a battery compartment in the equipment is permitted if all of the following conditions are met:	*No specific requirements for bare conductive parts of an external circuit (including TNV circuits). However, ordinary persons shall not have access to ES2 or ES3 external circuits regardless of location.*
2.1.1.3 Access to ELV wiring	**5.4.6 Insulation of internal wire as a part of a supplementary safeguard** *This requirement is derived from IEC 60950-1, sub-clause 2.1.1.3.*
2.1.1.4 Access to hazardous voltage circuit wiring Where the insulation of internal wiring at hazardous voltage is accessible to an operator or is not routed and fixed to prevent it from touching unearthed accessible conductive parts, it shall meet the requirement of 3.1.4 for reinforced or double insulation.	*No equivalent sub-clause, but ES3 requires double or reinforced insulation. See 5.3.6.1.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.1.1.5 Energy hazards	*No requirements. No injury can be ascribed to the values specified in IEC 60950-1, 2.1.1.5.*
2.1.1.6 Manual controls	*See 5.3.6.1.*
2.1.1.7 Discharge of capacitors in equipment 1 s for pluggable equipment type a; and 10 s for pluggable equipment type b.	**5.5.2.3 Safeguards against capacitor discharge** *For ordinary persons, means for discharging the capacitor to ES1 limits of Table 7 within 2 s.* *For instructed persons, means for discharging the capacitor to ES2 limits of Table 7 within 2 s.*
2.1.1.8 Energy hazards - d.c. mains supplies	*No specific requirements. However, charged capacitors are in 5.2.2.3 and 5.5.2.3.*
2.1.1.9 Audio amplifiers in information technology equipment Accessible circuits, terminals and parts of audio amplifiers and associated circuits shall comply with either − 2.1.1.1 of this standard, or − 9.1.1 of IEC 60065.	*Access requirements of 5.3.6 and Annex E apply.* **Annex E** **(normative)** **Test conditions for equipment containing audio amplifiers**
2.1.2 Protection in service access areas	**5.3.4 Protection of a skilled person** *Similar. Also, see Table 11.*
No equivalent statements.	**5.3.4.1 Safeguards between ES1 or ES2 and a skilled person** **5.3.4.2 Safeguards between ES3 and a skilled person**
2.1.3 Protection in restricted access areas	*See 5.5.2.3.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent statements.	**5.3.5 Safeguards between energy sources** *Protection is based on safeguarding persons, not on locations. Locations may restrict various persons such as ordinary persons and children.*
No equivalent statements.	**5.3.5.1 General** **5.3.5.2 Safeguards between ES1, ES2 and ES3** **5.3.5.3 Protection of ES2 against ES3**
No equivalent statements.	**5.3.6.4 Terminals for connecting stripped wire**
2.2 SELV circuits *42.4 V peak, 60 V dc, for 200 ms to TNV level.*	**5.2.2.2 Steady state voltage and current limits** *ES1 at low frequencies: 42.4 V peak, 60 V dc* *ES1 at high frequencies: 70 V rms*
2.2.1 General requirements	*Covered in 5.2*

<table>
<tr><th>IEC 60950-1 Second edition, 2005-12 and Amendment 1</th><th>IEC 62368-1 Edition 1.0, 2010-01</th></tr>
<tr><td>

2.2.2 Voltages under normal conditions

</td><td>

5.2.2.2 Steady state voltage and current limits

Table 4 – Electrical energy source limits for d.c. and low frequency a.c. currents

<table>
<tr><th>Energy source</th><th>ES1 limit</th><th>ES2 limit</th><th>ES3</th></tr>
<tr><td>DC</td><td>2 mA</td><td>25 mA</td><td rowspan="3">Greater than ES2 limit</td></tr>
<tr><td>AC up to 1 kHz</td><td>0,5 mA r.m.s.
0,707 mA peak</td><td>5 mA r.m.s.
7,07 mA peak</td></tr>
<tr><td>Combined a.c. and d.c.</td><td>$\frac{I_{dc}\ \text{mA}}{2} + \frac{I_{ac}\ \text{mA r.m.s.}}{0,5} \le 1$
$\frac{I_{dc}\ \text{mA}}{2} + \frac{I_{ac}\ \text{mA peak}}{0,707} \le 1$</td><td>See Figure 24</td></tr>
<tr><td colspan="4">Peak values are to be used for non-sinusoidal current.
The current limits are derived from IEC 60479-1 for dry conditions.</td></tr>
</table>

Table is derived from the requirements and specifies the limits for normal operating conditions.

</td></tr>
<tr><td>

No equivalent requirements

</td><td>

5.2.2.4 Single pulse limits

New requirement.

</td></tr>
</table>

<table>
<tr><th>IEC 60950-1 Second edition, 2005-12 and Amendment 1</th><th>IEC 62368-1 Edition 1.0, 2010-01</th></tr>
<tr><td>

2.2.3 Voltages under fault conditions

Repetitive pulses

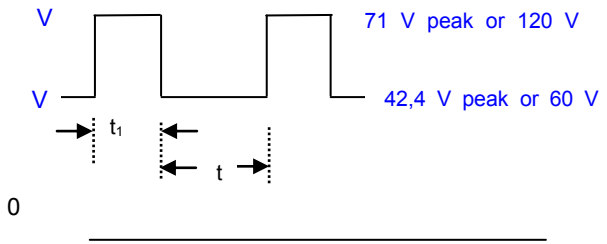


Figure 2E – Voltages in SELV circuits under single fault conditions

if t1 ≤ 20 ms, t2 shall be greater than 1 s;
if t1 > 20 ms, t2 shall be greater than 3 s; and
t1 shall not exceed 200 ms.

</td><td>

5.2.2.5 Limits for repetitive pulses

Table 10 – Electrical energy source limits for repetitive pulses

Pulse off time		ES1	ES2	ES3
Less than 3 s	Current	0,707 mA peak	7,07mA peak	Greater than ES2 limit
	Voltage	42,4 V peak	70,7 V peak	
3 s or more	Current	2 mA peak	See Table 9	
	Voltage	60 V peak	See Table 8	

Under single fault conditions, ES2 is the limit for both ES1 and ES2

</td></tr>
<tr><td>

2.2.4 Connection of SELV circuits to other circuits

</td><td>

5.3.5 Safeguards between energy sources

See Table 12.

</td></tr>
<tr><td>

2.3 TNV circuits

Under single fault condition and above 200 ms: 120 V dc, or 71 V ac peak, Figure 2F.

</td><td>

TNV circuits are considered external circuits. The limits for both normal operating conditions and single fault conditions are:

ES2 at low frequencies: 70.7 V peak, 120 V dc

ES2 at high frequencies: 140 V rms.

</td></tr>
</table>

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.3.1 Limits	**5.2.2.6 Ringing signals** *Where the electrical energy source is an analogue telephone network ringing signal as defined in Annex H, the energy source class is considered ES2.*
2.3.2 Separation of TNV circuits from other circuits and from accessible parts *SELV and TNV-1 are separated from TNV-2 and TNV-3 that limits are not exceeded under single fault conditions.* *Protection can be made by* • *Basic Insulation,* • *Earthing,* • *Other constructions*	**5.3.5 Safeguards between energy sources** *See Table 12.*
2.3.2.1 General requirements	**5.3.5.1 General** *See Table 12.*
2.3.2.2 Protection by basic insulation *TNV2 and TNV3 require the same protection.*	**5.3.5.2 Safeguards between ES1, ES2, ES3** *See Table 12. ES2 (TNV2) and ES3 (TNV3) are not considered equal. Basic insulation is an example of an acceptable safeguard between ES2 and ES1. However double or reinforced safeguard is required between ES3 and ES1.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.3.2.3 Protection by earthing *Earthing the SELV to the protective earthing terminal.*	**5.3.5.2 Safeguards between ES1, ES2, ES3** *See Table 12. Protective conductor is an example of an acceptable safeguard between ES2 and ES1. However double or reinforced safeguard is required between ES3 and ES1.* **5.6.8 Reliable earthing** *Heading only.* **5.6.8.1 General** This subclause specifies situations where the equipment connection to earth is considered reliable (for example, when a SPD is provided in accordance with 5.5.2.8). **5.6.8.2 Reliable earthing for protection** **5.6.8.3 Reliable earthing when the basic safeguard between ES1 and ES2 is provided by earthing ES1**
2.3.2.4 Protection by other constructions	*See Table 12.*
2.3.3 Separation from hazardous voltages	**5.3 Protection against electrical energy sources** *Heading only.*

<table>
<tr><th>IEC 60950-1 Second edition, 2005-12 and Amendment 1</th><th>IEC 62368-1 Edition 1.0, 2010-01</th></tr>
<tr><td>

2.9.4 Separation from hazardous voltages

Where accessible SELV and TNV circuits are separated from parts at Hazardous Voltage by one of the following methods:

Method 1: Double or Reinforced Insulation,

Method 2: Basic Insulation and protective screening,

Method 3: Basic Insulation and protective earthing,

Other constructions providing equivalent separation.

</td><td>

5.3.1 General

Table 11 – Overview on safeguard requirements (persons)

Person	Required number of equipment safeguards interposed between an electrical energy source and persons		
	ES1	ES2	ES3
Ordinary person	0	1	2
Instructed person	0	0	2
Skilled person	0	0	0 or 1 [a]
[a] See 4.3.4.4.			

5.3.5 Safeguard between energy sources

Requirements similar to IEC 60950-1.

Table 12 – Overview of required number of equipment safeguards

Electrical energy source	Required number of interposed equipment safeguards		
	ES1	ES2	ES3
ES1	0	1	2 [a]
ES2	1	0	2 [b]
ES3	2 [a]	2 [b]	0
[a] See 5.3.5.2.			
[b] See 5.3.5.3.			

</td></tr>
<tr><td>

2.3.4 Connection of TNV circuits to other circuits

</td><td>

5.3.5 Safeguards between energy sources

TNV circuits are considered external circuits.

</td></tr>
<tr><td>

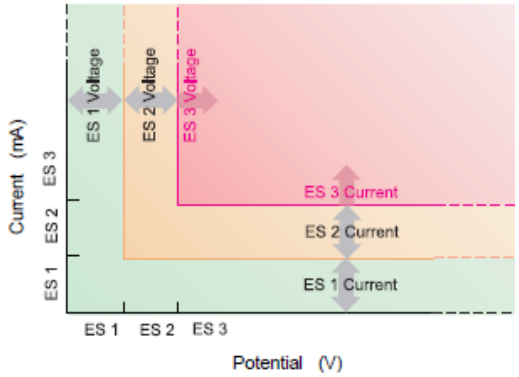
2.3.5 Test for operating voltages generated externally

</td><td>

No similar requirements.

</td></tr>
</table>

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.4 Limited Current circuits *Charge: 0.1 µF at 450 V (under normal and single fault condition)* *For U between 0.45 and 15 kV, Capacitance in nF shall be below 45/U* *Example: U=1 kV, C<45 nF* *For U above 15 kV, Capacitance in nF shall be below 700/U* *Example: U=20 kV, C<1.75 nF*	**5.2.2.3 Capacitance limits** **Table 7, Electrical energy source limit for a charged capacitor** *Example: 0,1 µF at 194 V (ES2)* *Example: U=1 kV, C=8 nF (ES2)* *Example: U=20 kV, C=0.4 nF*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.4.1 General requirements	**5.2.2 ES1, ES2 and ES3 limits** **5.2.2.1 General** *Similar requirements. See Figure 23. ES1 and ES2 are defined by EITHER the voltage or the current. ES3 is defined by BOTH the voltage and the current.*  **Figure 23 – Illustration that shows that ES limits depend on both voltage and current** As illustrated in Figure 23, for ES1 and ES2, for any voltage up to the limit voltage, there is no limit for the current. Likewise for any current up to the limit current, there is no limit for the voltage. However, for ES1 and ES2, in no case can both the current limit and the voltage limit be exceeded. ES2 is an energy source where both the voltage and current exceed the limits for ES1, but do not exceed the limits for ES2. ES3 is any source where both the voltage limit and current limit exceed ES2. Voltage limits in this figure do not apply to charged capacitors (see 5.2.2.3).
2.4.2 Limit values	**5.2.2.2 Steady-state voltage and current limits** *See Table 4, Table 6, Table 7.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.4.3 Connection of limited current circuits to other circuits	*See Table 12.*
2.5 Limited Power Sources	Annex Q (normative) Interconnection with building wiring *Heading only. A limited power source applies to circuits connected to building wiring.*
	Q.1 Limited Power *Equivalent requirements. A limited power source comprises a PS2 circuit.*
	Q.2 Compliance and test method *Compliance statements are separately numbered. Equivalent requirements.*
	Q.3 Test for external circuits – paired conductor cable *New requirement.*
No similar requirements.	Annex R (normative) Limited short-circuit test R.1 General R.2 Determination of the overcurrent protective device and circuit R.3 Test method R.4 Compliance

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.6 Protective earthing and bonding *Heading only.*	**5.6 Protective conductor** *Heading only.*
2.6.1 Protective earthing *List of parts required to be connected to the PE terminal.*	*No similar list.*
No similar requirements. Concepts of ES1 and ES2 are not defined.	**5.6.5 Protective conductors used as a basic safeguard between ES1 and ES2** *Heading only.* **5.6.5.1 General** **5.6.5.2 Fault current-carrying protective conductors** **5.6.5.2.1 General** **5.6.5.2.2 Requirements** **5.6.5.2.3 Compliance** *New requirements for protection between ES1 and ES2.*
2.6.2 Functional earthing *Isolation of functional earth conductors from hazardous voltages.*	*No similar requirements. Functional earthing does not provide a safeguard function.*
2.6.3 Protective earthing conductors and protective bonding conductors *Heading only.*	**5.6 Protective conductor** *Heading only.*
2.6.3.1 General	**5.6.1 General requirements** *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.6.3.2 Size of protective earthing conductors Table 3B	5.6.6.2 Size of protective earthing conductor and terminals Table 34 *Requirements are similar.*
2.6.3.3 Size of protective bonding conductors Table 2D *Table 2D starts at 16 amperes.*	5.6.6.3 Size of protective bonding conductor and terminals Table 35 *Requirements are similar. Table 35 starts at 6 amperes.*
2.6.3.4 Resistance of earthing conductors and their terminations Table 2E	5.6.6.4 Resistance of protective conductors and their terminations 5.6.6.4.1 Requirements 5.6.6.4.2 Compliance and test method *Requirements are equivalent. Refers to Table 34 (wire size) and Table 36 (terminal size).*
2.6.3.5 Colour of insulation	5.6.3 Colour of insulation *Requirements are equivalent.*
2.6.4 Terminals	*No similar heading.*
2.6.4.1 General	*No similar heading.*
2.6.4.2 Protective earthing and bonding terminals	5.6.6.2 Size of protective earthing conductors and terminals *Requirements are similar.* 5.6.6.3 Size of protective bonding conductors and terminals *Requirements are similar.*
2.6.4.3 Separation of the protective earthing conductor from protective bonding conductors	*No similar requirements.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.6.5 Integrity of protective earthing	*No similar heading.*
2.6.5.1 Interconnection of equipment	*No similar requirements.*
2.6.5.2 Components in protective earthing conductors and protective bonding conductors	5.6.1 General requirements *Requirements are similar.*
2.6.5.3 Disconnection of protective earth	
2.6.5.4 Parts that can be removed by an operator	
2.6.5.5 Parts removed during servicing	
2.6.5.6 Corrosion resistance Annex J Table of electrochemical potentials	5.6.2 Corrosion Annex N Electrochemical potentials *Requirements are equivalent. Instead of referring to "above the line in Annex J," the limit is 0.6 volt.*
Concept of protective earthing as a double or reinforced safeguard is not used.	5.6.7 Protective earthing conductors serving as a double or reinforced safeguard *New requirement.* 5.6.7.1 General This subclause specifies requirements for enhanced protective earthing conductors and their terminations (for example, when the touch current exceeds the ES2 limits in Table 4, see also 5.7.6). 5.6.7.2 Requirements for protective earthing conductors serving as a reinforced Safeguard 5.6.7.3 Requirements for terminations 5.6.7.4 Compliance

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	5.6.8 Reliable earthing *Heading only.* **5.6.8.1 General** This subclause specifies situations where the equipment connection to earth is considered reliable (for example, when a SPD is provided in accordance with 5.5.2.8). **5.6.8.2 Reliable earthing for protection** **5.6.8.3 Reliable earthing when the basic safeguard between ES1 and ES2 is provided by earthing ES1**
2.6.5.7 Screws for protective bonding *Requirements apply to self-tapping and space-threaded screws.*	**5.6.6.4.1 Requirements** *Requirements do not distinguish self-tapping and space-threading screws. Requirements are for cross-section and nominal thread diameter of screws for terminals for protective conductors.*
2.6.5.8 Reliance on telecommunication network or cable distribution system Protective earthing shall not rely on a TELECOMMUNICATION NETWORK or a CABLE DISTRIBUTION SYSTEM.	**5.6 Protective conductors** *The requirements for **protective conductors** preclude use of an **external circuit** (telecommunication network or cable distribution system) for protective earthing.*
No equivalent statements.	**5.6.4 Test for low current carrying protective conductors**
2.7 Overcurrent and earth fault protection in primary circuits *Heading only.*	**5.6.6 Protective conductors used as a supplementary safeguard** *Heading only.*
No equivalent statements.	**5.6.6.1 General**
2.7.1 Basic requirements	*No specific requirement for an overcurrent protective device. However, requirements for protective bonding refer to the rating of the relevant overcurrent protective device.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.7.2 Faults not simulated in 5.3.7	*No equivalent statement. All faults must be mitigated by a safeguard, either as part of the equipment or part of the installation.*
2.7.3 Short-circuit backup protection	*No equivalent requirement. All faults must be mitigated by a safeguard, either as part of the equipment or part of the installation.*
2.7.4 Number and location of protective devices	*No equivalent requirement. All faults must be mitigated by a safeguard, either as part of the equipment or part of the installation.*
2.7.5 Protection by several devices	*No equivalent requirement.*
2.7.6 Warning to service persons	*No equivalent requirement. Service persons are "skilled persons" and can perceive that the fuse is in the neutral and the other parts of the circuit are live. See 4.3.4.3.*
2.8 Safety interlocks *Heading only.*	Annex K (normative) Safety interlocks *Heading only.*
	K.1 General *Heading only.*
2.8.1 General principles SAFETY INTERLOCKS shall be provided where OPERATOR access involves areas normally presenting hazards in the meaning of this standard.	*Interlock requirements are in Annex K. Individual clauses invoke Annex K as appropriate.*
2.8.2 Protection requirements	K.1.1 General requirements *Similar requirements.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Compliance is included in 2.8.2.	**K.1.2 Compliance and test method**
No similar requirement. Requirements for relays and switches are in 2.8.7.	**K.2 Components of the safety interlock safeguard mechanism**
2.8.3 Inadvertent reactivation	**K.3 Inadvertent change of operating mode** *Similar requirements.*
2.8.4 Fail-safe operation	**K.5 Fail-safe** *Heading only.*
	K.5.1 Requirement *Requirements are similar, but referenced to energy class.*
Compliance is included in 2.8.4.	**K.5.2 Compliance and test method**
2.8.5 Moving parts	**K.6 Mechanically operated safety interlocks** *Heading only.*
	K.6.1 Endurance requirement *Requirements are similar, but referenced to energy class.*
Compliance is included in 2.8.5.	**K.6.2 Compliance and test method**
2.8.6 Overriding - not bypass a SAFETY INTERLOCK for an extreme hazard unless another reliable means of safety protection becomes effective when the SAFETY INTERLOCK is thus bypassed. The equipment shall be designed such that the SAFETY INTERLOCK cannot be bypassed until the other means of protection is fully in place and operational.	**K.4 Interlock safeguard override** *Requirements are similar.* - if located in an area accessible to an **ordinary person** or, if applicable, an **instructed person**, shall not be operable by means of probes specified in Annex V, and shall require a tool for operation.

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.8.7 Switches and relays *Heading only.*	K.7 Interlock circuit isolation *Heading only.*
2.8.7.1 Contact gaps	K.7.1 Separation distances for contact gaps and interlock circuit elements *Requirements are more extensive.*
2.8.7.2 Overload test	K.7.2 Overload test *Same.*
2.8.7.3 Endurance test	K.7.3 Endurance test *Same.*
2.8.7.4 Electric strength test	K.7.4 Electric strength test *Same.*
2.8.8 Mechanical actuators	*Specific requirements are not described. General requirements for safeguards apply.*
2.9 Electrical insulation *Heading only.*	5.4 Insulation materials and requirements *Heading only.*
	5.4.1 General *Heading only.*
No similar requirement.	5.4.1.1 Insulation
2.9.1 Properties of insulating materials	5.4.1.2 Properties of insulating material 5.4.1.3 Compliance *Requirements are equivalent.*

<table>
<tr><th>IEC 60950-1 Second edition, 2005-12 and Amendment 1</th><th>IEC 62368-1 Edition 1.0, 2010-01</th></tr>
<tr><td>2.9.2 Humidity conditioning</td><td>5.4.10 Humidity conditioning
Requirements are equivalent.</td></tr>
<tr><td>2.9.3 Grade of insulation
Insulation shall be considered to be functional insulation, basic insulation, supplementary insulation, reinforced insulation or double insulation.
For double insulation it is permitted to interchange the basic insulation and supplementary insulation elements.</td><td>5.4.1.1 Insulation
Insulation providing a safeguard function is designated basic insulation, supplementary insulation, reinforced insulation, or double insulation.
4.4.4.1 General
Requirements for basic safeguards and supplementary safeguards, if they are elements of double safeguards, may be interchanged.</td></tr>
<tr><td>2.9.4 Separation from hazardous voltages</td><td>5.3 Protection against electrical energy sources
Safeguard between energy sources
Similar requirements
Table 12 – Overview of required number of equipment safeguards
<table>
<tr><th rowspan="2">Electrical energy source</th><th colspan="3">Required number of interposed equipment safeguards</th></tr>
<tr><th>ES1</th><th>ES2</th><th>ES3</th></tr>
<tr><td>ES1</td><td>0</td><td>1</td><td>2 [a]</td></tr>
<tr><td>ES2</td><td>1</td><td>0</td><td>2 [b]</td></tr>
<tr><td>ES3</td><td>2 [a]</td><td>2 [b]</td><td>0</td></tr>
<tr><td colspan="4">[a] See 5.3.5.2.
[b] See 5.3.5.3.</td></tr>
</table></td></tr>
<tr><td>2.10 Clearances, creepage distances and distances through insulation</td><td>No similar heading.</td></tr>
<tr><td>2.10.1 General
Compliance statement only.</td><td>Compliance statements are in the individual subclauses.</td></tr>
</table>

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.10.1.1 Frequency The insulation requirements given in 2.10 are for frequencies up to 30 kHz. It is permitted to use the same requirements for insulation operating at frequencies over 30 kHz until additional data is available.	**5.4.1.4 Frequency** *Insulation requirements for frequencies above 30 kHz are included to align with the basic safety publication IEC 60664-4.* For fundamental frequencies higher than 30 kHz but less than or equal to 400 kHz and peak working voltages higher than 900 V peak; or for frequencies higher than 400 kHz, the creepage distances requirements of IEC 60664-4 together with IEC 60664-1 apply. For solid insulation and frequencies above 30 KHz the high frequency test can be substituted by the electric strength test of 5.4.11.1 under the following conditions: the field strength is approximately uniform; no voids or air gaps are present in the solid insulation; the procedure of 5.4.4.9 is applied. **5.4.4.9 Solid insulation requirements at frequencies higher than 30 k Hz** *These new requirements for frequencies more than 30 kHz align with the basic safety publication IEC 60664-4.*
2.10.1.2 Pollution degrees	**5.4.1.6 Pollution degrees** *Descriptions are similar.*
2.10.1.3 Reduced values for functional insulation	*Functional insulation is not a safeguard; no requirements for functional insulation.*
2.10.1.4 Intervening unconnected conductive parts	*Not covered in general terms (only for resistors).*
2.10.1.5 Insulation with varying dimensions	**5.4.1.7 insulation in transformers with varying dimensions** *Requirements are similar.*
2.10.1.6 Special separation requirements	*Not covered. TNV circuits are external circuits in IEC 62368-1. Separation requirements are based on the need for isolation of external circuits.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.10.1.7 Insulation in circuits generating starting pulses	5.4.1.8 Insulation in circuits generating starting pulses *Requirements are similar.*
2.10.2 Determination of working voltage *Compliance statement.*	5.4.1.9 Determination of working voltage *Heading only.*
2.10.2.1 General	5.4.1.9.1 General *Requirements are similar.*
2.10.2.2 RMS working voltage	5.4.1.9.2 RMS working voltage *Requirements are similar.*
2.10.2.3 Peak working voltage	5.4.1.9.3 Peak working voltage *Requirements are similar.*

<table>
<tr><th>IEC 60950-1 Second edition, 2005-12 and Amendment 1</th><th>IEC 62368-1 Edition 1.0, 2010-01</th></tr>
<tr><td>2.10.3 Clearances
Annex G</td><td>5.4.2 Clearances
Requirements and procedure for determining minimum clearances is similar except for the following:
• requirements for frequencies above 30 kHz, in alignment with IEC 60664-4
• clearances based on electric strength test
• determination of transient voltages of external circuits.
Table 19 – Minimum clearances up to 2 000 m above sea level, inhomogeneous field distribution (for steady-state voltages, temporary overvoltages and recurring peak voltages for frequencies above 30 kHz)
<table>
<tr><th>Peak working voltage
up to and including
Vpeak</th><th>Basic insulation
or supplementary
insulation
mm</th><th>Reinforced
insulation
mm</th></tr>
<tr><td>600</td><td>0,06</td><td>0,12</td></tr>
<tr><td>800</td><td>0,18</td><td>0,36</td></tr>
<tr><td>1 000</td><td>0,5</td><td>1,0</td></tr>
<tr><td>1 200</td><td>1,4</td><td>2,8</td></tr>
<tr><td>1 400</td><td>2,35</td><td>4,7</td></tr>
<tr><td>1 600</td><td>4,0</td><td>8,0</td></tr>
<tr><td>1 800</td><td>6,7</td><td>13,4</td></tr>
<tr><td>2 000</td><td>11</td><td>22,0</td></tr>
<tr><td colspan="3">Linear interpolation may be used between the nearest two points, the calculated minimum clearances being rounded up to the next higher 0,1 mm increment.
These values are for clearances for basic insulation and supplementary insulation. For clearances for reinforced insulation, the clearances must be doubled.</td></tr>
</table></td></tr>
<tr><td>No equivalent requirements.</td><td>5.4.2.8 Minimum clearances based on electric strength test</td></tr>
<tr><td>2.10.3.1 General
when measuring CLEARANCES from the BOUNDING SURFACE of an ENCLOSURE of insulating material through a slot or opening in the ENCLOSURE or through an opening in an accessible connector, the accessible surface shall be considered to be conductive as if it were covered by metal foil wherever it can be touched by the test finger shown in Figure 2A (see 2.1.1.1), applied without appreciable force (see Figure F.12, point X).</td><td>5.4.1.10 Insulating surfaces
An accessible insulating surface is considered to be covered by a thin metallic foil for determining clearances, creepage distances and distance through insulation (see Figure O.13).</td></tr>
</table>

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent heading.	**5.4.2.4 Determination of transient voltages**
2.10.3.2 Mains transient voltages *Mains transient voltages for overvoltage categories I and II.*	**5.4.2.4 Determination of transient voltages**
2.10.3.3 Clearances in primary circuits *Clearances are based on mains transient voltage and peak working voltage.*	**5.4.2.7 Determination of the minimum clearance** *Clearances are based on required withstand voltage. Required withstand voltage is based on mains transient voltage, or peak working voltage, or frequency if more than 30 kHz.*
No equivalent requirement.	**5.4.2.8 Minimum clearances based on electric strength test** *Alternative to measuring clearances.*
2.10.3.4 Clearances in secondary circuits	*The requirements of 5.4.2.7 and 5.4.2.8 apply to both primary and secondary circuits, as applicable.*
2.10.3.5 Clearances in circuits generating starting pulses *Clearances are determined either by Annex G or by electric strength test.*	**5.4.1.8 Insulation in circuits generating starting pulses** *Refers to G.12.2.* **G.12 Circuits generating starting pulses** **G.12.1 Insulation in circuits generating starting pulses** **G.12.2 Clearances in circuits generating starting pulses** *Clearances are determined either by 5.4.2.7 or by electric strength test.*
2.10.3.6 Transients from an a.c. mains supply *Clearance is based on a.c. mains transients.* …transient in a SECONDARY CIRCUIT due to transients on the AC MAINS SUPPLY…	**5.4.2.5.2 DC source transient voltages** *Clearance is based on required withstand voltage.* …the required withstand voltage shall be assumed to be equal to the peak value of the d.c. voltage of the source, or the peak working voltage of the circuit isolated from the mains, whichever is higher.

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.10.3.7 Transients from a d.c. mains supply *A circuit connected to a DC MAINS SUPPLY is considered to be a SECONDARY CIRCUIT.*	**5.4.2.5.2 DC source transient voltages** *Clearance is based on required withstand voltage. A d.c. mains supply is not a secondary circuit.* …the required withstand voltage shall be assumed to be equal to the peak value of the d.c. voltage of the source, or the peak working voltage of the circuit isolated from the mains, whichever is higher.
2.10.3.8 Transients from telecommunication networks and cable distribution systems *1500 V peak for TNV-1 and TNV-3 circuits* *800 V peak for a TNV-2 circuit*	**5.4.2.5.3 External circuits transient voltages** *New requirement. Table 16 specifies transient voltages for various cable types and location of external circuits.*
2.10.3.9 Measurement of transient voltages	*Similar to 5.4.2.6 Measurement of transient voltage levels.*
No corresponding requirements.	**5.4.2.8 Clearances based on electric strength test**
2.10.4 Creepage Distance *Heading only.*	**5.4.3 Creepage Distance** *Heading only.*
2.10.4.1 General	**5.4.3.1 General** *Same plus additional requirements.*
No equivalent sub-clause.	**5.4.3.2 Test method** **5.4.3.2.1 Test conditions**
2.10.4.2 Material group and comparative tracking index	**5.4.3.2.2 Material group and CTI** *Same.*
2.10.4.3 Minimum creepage distances	**5.4.3.1 General** **5.4.3.3 Compliance** *Creepage distances are those for basic, supplementary, or reinforced insulation.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.10.5 Solid Insulation *Heading only.*	5.4.4 Solid Insulation *Heading only.*
2.10.5.1 General	5.4.4.1 General requirements
2.10.5.2 Distance through insulation	5.4.4.2 Minimum Distance through insulation *Requirements and procedure for determining minimum distance through insulation are similar.*
2.10.5.3 Insulating compound as solid insulation	5.4.4.3 Insulating compound forming solid insulation *Requirements are similar.*
2.10.5.4 Semiconductor devices	5.4.4.4 Solid insulation in Semiconductor devices *Requirements are similar.*
	G.16 Optocouplers as safeguards *Requirements are similar.*
2.10.5.5 Cemented joints	5.4.5 Insulating compound forming Cemented joints *Requirements are similar.*
2.10.5.6 Thin sheet insulation	5.4.4.6 Thin sheet material *Heading only.*
	5.4.4.6.1 General requirements *Requirements are similar.*
2.10.5.7 Separable thin sheet material	5.4.4.6.2 Separable thin sheet material *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.10.5.8 Non-separable thin sheet material	5.4.4.6.3 Non-separable thin sheet material *Requirements are similar.*
2.10.5.9 Thin sheet material - standard test procedure	5.4.4.6.4 standard test procedure for non-separable thin sheet material *Requirements are similar.*
2.10.5.10 Thin sheet material - alternative test procedure If layers can be separated for individual testing…	*If layers can be separated, then each layer is treated as separable material under 5.4.4.6.2.*
2.10.5.11 Insulation in Wound components	5.4.4.7 Solid Insulation in Wound components *Requirements are similar.*
IEC 60065	5.4.5 Antenna terminal insulation *Heading only.* 5.4.5.1 General 5.4.5.2 Test method 5.4.5.3 Compliance
2.10.5.12 Wire wound components 2.10.5.13 Wire with solvent based enamel in wound components	G.11 Wound components G.11.1 Wire insulation in wound components G.11.1.1 General G.11.1.2 Solvent-based enamel winding insulation *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent requirements.	G.11.1.3 Protection against mechanical stress in wound components G.11.1.4 Compliance and test method
2.10.5.14 Additional insulation in wound components	G.11.2 Additional insulation in wound components G.11.2.1 General requirements G.11.2.2 Compliance and test method *Requirements are equivalent.*
No equivalent requirements.	G.11.3 Endurance test on wound components G.11.3.1 General test requirements G.11.3.2 Compliance G.11.3.3 Heat run test G.11.3.4 Vibration test Specimens are tested according to G.21.3.4. *New requirement.*
2.10.6 Construction of printed boards	G.18 Printed boards *Heading only.*
	G.18.1 General *Same scope.*
2.10.6.1 Uncoated printed boards	G.18.2 Uncoated printed boards *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.10.6.2 Coated printed boards	G.18.3 Coated printed boards *Requirements are similar.* *An alternative method to qualify coated printed boards is given in IEC 60664-3:2003.*
2.10.6.3 Insulation between conductors on the same inner surface of a printed board *Refers to cemented joints in 2.10.5.5.*	G.18.4 Insulation between conductors on the same inner surface *Refers to cemented joints in 5.4.4.5. Requirements are similar.*
2.10.6.4 Insulation between conductors on different surfaces of a printed board	G.18.5 Insulation between conductors on different surfaces *Requirements are similar.*
2.10.7 Component external terminations	G.19 Coatings on component terminals *Requirements are similar. Refers to G.18.6.*
2.10.8 Tests on coated printed boards and coated components *Heading only.*	G.18.6 Tests on coated printed boards *Heading only.*
2.10.8.1 Sample preparation and preliminary inspection	G.18.6.1 Sample preparation and preliminary inspection *Requirements are similar.*
2.10.8.2 Thermal conditioning	G.18.6.2 Thermal conditioning *Requirements are similar.*
2.10.8.3 Electric strength test	G.18.6.3 Electric strength test *Requirements are similar.*
2.10.8.4 Abrasion resistance test	G.18.6.4 Abrasion resistance test *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
2.10.9 Thermal cycling	5.4.7 Thermal cycling is referenced *Requirements are similar.*
2.10.9 Thermal cycling test procedure	5.4.7 Thermal cycling test procedure *Requirements are similar.*
2.10.10 Test for pollution degree 1 environment for an insulating components	5.4.8 Test for pollution degree 1 environment for an insulating components *Requirements are similar.*
2.10.11 Test for semiconductor components and for cemented joints	5.4.9 Test for semiconductor components and for cemented joints *Requirements are similar.*
2.10.12 Enclosed and sealed parts	*Not specified. If the local environment complies with pollution degree 1 (see 5.4.4.3 and 5.4.8) then PD1 creepage distances and clearances may be used.*
3 Wiring, connections and supply	*No equivalent heading.*
3.1 General	*No equivalent heading.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.1.1 Current rating and overcurrent protection The cross-sectional area of internal wires and INTERCONNECTING CABLES shall be adequate for the current they are intended to carry when the equipment is operating under NORMAL LOAD such that the maximum permitted temperature of conductor insulation is not exceeded.	**6.3 Safeguards against fire under normal operating conditions and abnormal operating conditions** **6.3.1 Requirements** **6.3.2 Compliance** no part of the equipment shall attain a temperature value greater than 90 % of the autoignition temperature limit, in Celsius, of the part as defined by ISO 871. When the autoignition temperature of the material is not known, the temperature shall be limited to 300 °C. **5.4.1.5 Maximum operating temperatures for insulating materials** Under normal operating conditions, insulating material temperatures shall not exceed the temperature limit of the insulating material, including insulating materials of components, or the maximum temperature limit of the insulation system as given in Table 14. **6.5.4 Requirements for interconnection to building wiring.** Equipment intended to provide power over the wiring system to remote equipment shall limit the output current to a value that does not cause damage to the wiring system, due to overheating, under any external load condition. The maximum continuous current from the equipment shall not exceed a current limit that is suitable for the minimum wire gauge specified in the equipment installation instructions. **G.9.1 General** Mains supply cords shall have conductors with cross-sectional areas not less than those specified in Table G.4 (see also 5.6.7). *Requirements do not apply to PS1 circuits.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.1.1 Current rating and overcurrent protection All internal wiring (including busbars) and INTERCONNECTING CABLES used in the distribution of PRIMARY CIRCUIT power shall be protected against overcurrent and short-circuit by suitably rated protective devices. Wiring not directly involved in the distribution path does not require protection if it can be shown that creation of hazards is unlikely (for example, indicating circuits).	*No equivalent requirement.*
3.1.2 Protection against mechanical damage Wireways shall be smooth and free from sharp edges. Wires shall be protected so that they do not come into contact with burrs, cooling fins, moving parts, etc., which could cause damage to the insulation of conductors. Holes in metal, through which insulated wires pass, shall have smooth well-rounded surfaces or shall be provided with bushings.	*No equivalent requirement for internal wiring.* **G.9.4 Cord entry** *Applies to power cords only.*
3.1.3 Securing of internal wiring	*No equivalent requirement. See 5.4.6 for the case where insulation of internal wire is used as a supplementary safeguard.*
3.1.4 Insulation of conductors	**5.4.1.2 Properties of insulating material** **6.5 Internal and external wiring** **6.5.1 General** **6.5.2 Requirements** **6.5.3 Compliance** *Requirements are different.*
3.1.5 Beads and ceramic insulators	*No equivalent requirement. See 5.4.1.2 for insulating material properties.*
3.1.6 Screws for electrical contact pressure	*No equivalent requirement. Suitability of electrical contacts for protective earthing and bonding is determined by testing (see 5.6.6.4.).*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.1.7 Insulating materials in electrical connections	*No equivalent requirement.*
3.1.8 Self-tapping and spaced thread screws	*Requirements do not distinguish self-tapping and space-threading screws. Requirements are for cross-section and nominal thread diameter of screws for terminals for protective conductors.*
3.1.9 Termination of conductors	*No equivalent requirement. See 5.6.6.4 for termination of protective conductors.*
3.1.10 Sleeving on wiring	*No equivalent requirement. See G.11.1.3 for sleeving in wound components. See 5.4.6 for sleeving used as supplementary insulation for internal wiring.*
3.2 Connection to a mains supply	*No equivalent sub-clause.*
3.2.1 Means of connection *Heading only.*	*No equivalent sub-clause.*
3.2.1.1 Connection to an a.c. mains supply	*No equivalent requirement. Requirements are for the protective earthing that is included with the means for connection to the supply.*
3.2.1.2 Connection to a d.c. mains supply	*No equivalent requirement. Requirements are for the protective earthing that is included with the means for connection to the supply.*
3.2.2 Multiple supply connections	*No equivalent requirement.*
3.2.3 Permanently connected equipment	*No equivalent requirement.*
3.2.4 Appliance inlets *Heading only.*	G.20 Mains connectors *Referenced standards are the same. Includes additional references to IEC/TR 60083 and IEC 60906-1 or -2.*
3.2.5 Power supply cords *Heading only.*	G.9 Mains supply cords *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.2.5.1 AC power supply cords	G.9.1 General G.9.2 Compliance and test method *Similar requirements. Conductor sizes are provided for current ratings below 3 A and up to 160 A.*
3.2.5.2 DC power supply cords	G.9.1 General G.9.2 Compliance and test method *Requirements for DC power supply cords are the same as those for AC power supply cords.*
3.2.6 Cord anchorages and strain relief	G.9.3 Cord anchorages and strain relief for non-detachable power supply cords G.9.3.1 General G.9.3.2 Cord strain relief G.9.3.2.1 Requirements G.9.3.2.2 Strain relief mechanism failure G.9.3.2.3 Cord sheath or jacket position G.9.3.2.4 Strain relief comprised of polymeric material *Strain relief requirements are essentially the same but a torque test also applies.* G.9.4 Cord entry
3.2.7 Protection against mechanical damage	G.9.3.2.3 Cord sheath or jacket position G.9.4 Cord entry *Mechanical protection requirements are essentially the same.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.2.8 Cord guards	G.9.4 Cord entry G.9.5 Non-detachable cord bend protection G.9.5.1 Requirements G.9.5.2 Compliance and test method *Requirements and test method are essentially the same.*
No equivalent requirement.	G.9.6 Cord replacement *New requirement.*
3.2.9 Supply wiring space	G.9.7 Supply wiring space G.9.7.1 General requirements *Requirements are essentially the same.*
3.3 Wiring terminals for connection of external conductors	*No equivalent sub-clause.*
3.3.1 Wiring terminals	*No direct equivalent but see G.9.6 cord replacement.*
3.3.2 Connection of non-detachable power supply cords	*No equivalent sub-clause.*
3.3.3 Screw terminals	*No specific requirements for screw terminals but see requirements for PIS in 6.2.3.1, Arcing PIS.*
3.3.4 Conductor sizes to be connected Table 3D – Range of conductor sizes to be accepted by terminals	G.9 Mains supply cords Table G.4 – Sizes of conductors in mains supply cords. *Range of sizes of conductors is greater. Requirements for terminals are not specified.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.3.5 Wiring terminal sizes *Table 3E applies for mains supply cord conductors and protective conductors.*	**5.6.6.4 Resistance of protective conductors and their terminations** **5.6.6.4.1 Requirements** The terminals shall comply with IEC 60998-1 and IEC 60999-1 or IEC 60999-2. **5.6.6.4.2 Compliance and test method** *Table 36 specifies protective conductor terminal size. No specific requirements for mains conductors terminal size.*
3.3.6 Wiring terminal design	**5.6.6.4 Resistance of protective conductors and their terminations** **5.6.6.4.1 Requirements** The terminals shall comply with IEC 60998-1 and IEC 60999-1 or IEC 60999-2. **5.6.6.4.2 Compliance and test method** **5.6.7.3 Requirements for terminations** The terminations shall have reliable securement and shall comply with Table 36.
3.3.7 Grouping of wiring terminals	*No equivalent requirement.*
3.3.8 Stranded wire	**G.9.7.2 Stranded wire** **G.9.7.2.1 Requirements** **G.9.7.2.2 Compliance and test method** *Requirements are identical. Text is editorially separated into requirements and compliance.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.4 Disconnection from the mains supply *Heading only.*	**Annex L** **(normative)** **Disconnect Devices** *Heading only.*
	L.1 General requirements *Heading only.*
3.4.1 General requirement	**L.1.1 General** *Identical requirements but note the provision for the use of a removable fuse as a disconnect device for instructed and skilled persons.*
3.4.2 Disconnect devices	
3.4.3 Permanently connected equipment	**L.1.2 Permanently connected equipment** *Requirements are similar.*
3.4.4 Parts which remain energized	**L.1.3 Parts that remain energised** *Requirements are the same but note provision for use of instructions as an alternative.*
3.4.5 Switches in flexible cords	**G.1.2 Requirements for switches** *Requirements are similar.*
3.4.6 Number of poles - single-phase and d.c. equipment	**L.1.4 Single phase equipment** *Requirements are similar. Note different terminology in references to line and phase conductors.*
3.4.7 Number of poles – three-phase equipment	**L.1.5 Three phase equipment** *Requirements are similar. Note different terminology in references to line and phase conductors.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.4.8 Switches as disconnect devices	L.1.6 Switches as disconnect devices *Requirements are similar.*
3.4.9 Plugs as disconnect devices *See 1.7.2.2.*	L.1.7 Plugs as disconnect devices *Requirements are similar.*
3.4.10 Interconnected equipment	L.1.8 Multiple power sources *Requirements are similar.*
3.4.11 Multiple power sources	L.1.8 Multiple power sources *Requirements are similar, but not the requirement to group multiple disconnect devices. Includes specific requirements for equipment incorporating an internal UPS.*
	L.2 Compliance
3.5 Interconnection of equipment	*No equivalent sub-clause.*
3.5.1 General requirements	5.3 Protection against electrical energy sources 5.3.1 General *All circuits are classified as ES1 or ES2, or ES3 and safeguards between each circuit type are detailed in Table 12.*
3.5.2 Types of interconnection circuits	5.3 Protection against electrical energy sources 5.3.1 General *All circuits are classified as ES1 or ES2, or ES3 and safeguards between each circuit type are detailed in Table 12.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
3.5.3 ELV circuits as interconnection circuits	**5.3 Protection against electrical energy sources** **5.3.1 General** *All circuits are classified as ES1 or ES2, or ES3 and safeguards between each circuit type are detailed in Table 12.*
3.5.4 Data ports for additional equipment To limit the risk of fire in an additional equipment or accessory (for example, a scanner, mouse, keyboard, DVD drive, CD ROM drive or joystick), SELV CIRCUITS of a data port for connection of such equipment shall be supplied by a limited power source (ref: 2.5). This requirement does not apply if it is known that the additional equipment complies with 4.7 (Resistance to fire).	**6.7 Safeguards against fire due to the connection of secondary equipment** Where it is unknown that the connected equipment or accessories (for example, a scanner, mouse, keyboard, DVD drive, CD ROM drive or joystick) are likely to comply with this standard, the delivered power shall be limited to PS2. *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
4 Physical requirements	*No equivalent sub-clause.*
4.1 Stability *The requirements are applicable to all the floor standing or tabletop equipment, depending on their mass. Force applied at 2 m height.*	8.6 Stability of equipment 8.6.1 Requirements *Major differences and new requirements.*
	8.6.2 Static stability for floor standing equipment 8.6.2.1 Requirements *Provides new category of requirements for the stability of the equipment that can be handled, moved, or relocated during intended use or installation.*
	8.6.2.2 Static stability test *Applicable to MS3 (mass more than 25 kg).* *The 250 N force test is similar, though the force is applied at a height not exceeding 1.5 m, and the force is discontinued if the equipment is stable when tilted 15° .*
	8.6.2.3 Relocation stability test *Floor standing MS2 or MS3 (i.e. heavier than 7 kg) equipment are, if possible, to be moved or relocated, subject to 10° tilt test.*
	8.6.3 Non-floor standing equipment having controls that are accessed during normal use or having displays with moving images 8.6.3.1 Glass slide test *New requirement.*
	8.6.3.2 Horizontal force test

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	8.6.3.2.1 General 8.6.3.2.2 Test method *New requirement.*
4.2 Mechanical strength *Heading only.*	Annex T (normative) Mechanical strength tests *Heading only.*
4.2.1 General *General requirements for mechanical strength.*	T.1 General *Introduction to test methods.*
4.2.2 Steady force test, 10 N	T.2 Steady force test, 10 N *Requirements are similar.*
4.2.3 Steady force test, 30 N	4.4.5 Safeguard robustness *Requires safeguards to comply with Annex T.*
	T.3 Steady force test, 30 N *Requirements are similar.*
No equivalent requirement.	T.4 Steady force test, 100 N *New test requirement for transportable, hand-held and direct plug-in equipment.*
4.2.4 Steady force test, 250 N	T.5 Steady force test, 250 N *Requirements are similar. Equipment types specified in T.4 are exempted from this test.*
4.2.5 Impact test	T.6 Enclosure impact test

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	Requirements are similar. Movable equipment requiring lifting or handling by an ordinary person is exempted from the test.
4.2.6 Drop test *Applies to desktop equipment 5 kg or less.*	**T.7 Drop test** *Requirements are similar. Applies to desk top equipment 7 kg or less.*
4.2.7 Stress relief test	**T.8 Stress relief test** *Requirements are similar.*
No equivalent sub-clause.	**T.9 Glass breakage** *Heading only.* **T.9.1 General**
4.2.8 Cathode ray tubes *Fully refers to Clause 18 of IEC 60065.*	**T.9.2 Impact test and compliance** *Partially covers the requirements of Clause 18 of IEC 60065.*
	Annex U **(normative)** **Mechanical strength of CRTs and protection against the effects of implosion** *Requirements are similar.* **U.1 General** **U.2 Compliance and test method for non-intrinsically protected CRTs**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	U.3 Protective screen
No equivalent requirement.	T.9.3 Fragmentation test and compliance
No equivalent requirement.	T.10 Test for telescoping or rod antennas
No equivalent requirement.	8.5.5 Protection of persons against loosening, exploding or imploding parts *Heading only.*
No equivalent sub-clause.	8.5.5.1 Protection against MS3 parts *Applies to rotating media, CRTs, and high-pressure lamps.*
4.2.9 High pressure lamps	8.5.5.2.2 High Pressure lamps *Heading only. New requirements.* 8.5.5.2.2.1 General 8.5.5.2.2.2 Test method

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	8.5.5.2.2.3 Compliance
4.2.10 Wall or ceiling mounted equipment	8.7 Equipment mounted to a wall or ceiling *Heading only.* 8.7.1 General 8.7.2 Test method 8.7.3 Compliance *Requirements are similar.*
4.2.11 Rotating solid media	8.5.5.2 Requirements and test methods *Heading only.* 8.5.5.2.1 Mechanical enclosure requirements for rotating solid media 8.5.5.2.1.1 General 8.5.5.2.1.2 Test method 8.5.5.2.1.3 Compliance *Requirements are similar.*
4.3 Design and construction	*No equivalent sub-clause.*
4.3.1 Edges and corners	8.4 Safeguards against parts with sharp edges and corners *Heading only.* 8.4.1 Requirements

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	8.4.2 Instructional safeguards *Requirements are similar. Requirements include instructional safeguards.* 8.4.3 Compliance
4.3.2 Handles and manual controls	8.8 Handle strength test method *Heading only.* 8.8.1 General 8.8.2 Compliance and test method *Requirements are more stringent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No requirements.	8.9 Wheels or casters attachment requirements *Heading only.* 8.9.1 General 8.9.2 Test method
No requirements specifically for carts etc. but 4.1 may be applicable.	8.10 Carts, stands, and similar carriers *Heading only.* 8.10.1 General 8.10.2 Marking and instructions 8.10.3 Cart, stand or carrier loading test and compliance 8.10.4 Cart, stand or carrier impact test 8.10.5 Mechanical stability 8.10.6 Thermoplastic temperature stability *New requirements specifically for carts etc.*
No requirements.	8.12 Telescoping or rod antennas *New requirement.*
4.3.3 Adjustable controls	B.3 Simulated abnormal operating conditions *Heading only.* B.3.1 General B.3.4 Setting of voltage selector *Annex B.3 has wide coverage of abnormal operating conditions, including selection or*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	adjustment of controls.
4.3.4 Securing of parts	G.7.2 Insulation G.7.2.1 Requirements *Requirements are similar.*
4.3.5 Connection by plugs and sockets	*No specific requirements.*
4.3.6 Direct plug-in equipment	*No specific requirements.*
4.3.7 Heating elements in earthed equipment	*No specific requirement. PS2 and PS3 requirements apply to all parts, including heating elements.*
4.3.8 Batteries	7.6 Batteries *Invokes Annex M.* Annex M Batteries and fuel cells *Heading only. Major differences.* M.1 General requirements M.2 Safety of battery cells and batteries *Heading only.* M.2.1 Requirements M.2.2 Compliance and test method M.3 Protection in battery circuits M.3.1 Requirements M.3.2 Test method

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	M.3.3 Compliance M.4 Endurance of a battery and its enclosure M.4.1 Requirements M.4.2 Compliance and test method M.5 Risk of burn due to short circuit during carrying M.5.1 Requirements M.5.2 Compliance and test method M.6 Prevention of short circuits and protection from other effects of electric Current M.6.1 Short circuits M.6.1.2 Test method to simulate an internal fault M.6.1.3 Compliance M.6.2 Leakage currents M.7 Risk of explosion from lead acid and NiCd batteries M.7.1 Ventilation preventing explosive gas concentration M.7.2 Compliance and test method M.8 Protection against internal ignition from external spark sources of lead acid batteries M.8.1 General

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	M.8.2 Test method M.8.2.1 General M.8.2.2 Estimation of hypothetical volume Vz M.8.2.3 Correction factors M.8.2.4 Calculation of distance d M.9 Preventing electrolyte spillage M.9.1 Protection from electrolyte spillage *Requirements are similar.* M.9.2 Tray for preventing electrolyte spillage M.10 Instructions to prevent reasonably foreseeable misuse
4.3.9 Oil and grease	*No requirements.*
No equivalent sub-clause.	7 Chemically-caused injury *Heading only.* 7.1 General *Introduction only. No requirements.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
4.3.10 Dust, powders, liquids and gases 4.3.11 Containers for liquids or gases 4.3.12 Flammable liquids	7.2 Reduction of exposure to hazardous chemicals *Requires inspection to ensure container is suitable for the chemical-* 7.4 Use of PPE *New provision to allow use of PPE where containment of chemical is not practical-* 7.5 Use of instructional safeguards and instructions *New requirement for instructional safeguard for hazardous chemicals-* P.3 Safeguards against spillage of internal liquids *Heading only.* *Requirements are different.* *No requirements for flammable liquids and dust. (Refer to Note in 6.3.1).*
	P.3.1 General *New requirement.*
	P.3.2 Determination of spillage consequences *New requirement.*
	M.7 Risk of explosion from lead acid and NiCd batteries *New requirement.*
	M.8 Protection against internal ignition from external spark sources of lead acid batteries *New requirement.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	New requirement. G.21 Liquid filled components G.21.1 General G.21.2 Requirements G.21.3 Compliance and test methods G.21.3.1 Hydrostatic pressure test G.21.3.2 Creep resistance test G.21.3.3 Tubing and fittings compatibility test G.21.3.4 Vibration test G.21.3.5 Thermal cycling test G.21.3.6 Force test G.21.4 Compliance
4.3.13 Radiation *Heading only.*	10 Radiation *Heading only.*
4.3.13.1 General	10.1 General *Requirements are similar. New requirements for protection against excessive sound pressure.* 10.2 Radiation energy source classifications *New requirement.* 10.2.1 RS1

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	10.2.2 RS2 10.2.3 RS3
No equivalent sub-clause.	10.3 Requirements for electromagnetic radiation *New requirement.* 10.3.1 Protection of persons from non-ionizing radiation 10.3.1.1 General
4.3.13.2 Ionizing radiation *The requirements are in Annex H.*	10.3.3 Protection of persons from ionizing radiation (X-radiation) *Requirements are re-organized.* 10.3.3.1 General 10.3.3.2 Requirements 10.3.3.3 Compliance 10.3.3.4 Test method
4.3.13.3 Effect of ultraviolet (UV) radiation on materials	10.3.4 Protection of materials from lamps that produce UV radiation *Requirements are specified in Annex C.* Annex C (normative) UV radiation C.1 Protection of materials in equipment from UV radiation C.1.1 General

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	C.1.2 Requirements C.1.3 Test method *Requirements are similar. Table C.1 is the same as Table 4A.*
4.3.13.4 Human exposure to ultraviolet (UV) radiation	10.3.1.3 Non-ionising optical radiation from lamps and lamp systems (including LEDs) *Major differences. The requirements are based on IEC 62471.* 10.3.1.3.1 General 10.3.1.3.2 Requirements 10.3.1.3.3 Compliance
4.3.13.5 Lasers (including LEDs)	10.3.1.2 Non-ionizing radiation from lasers *Similar requirements, though the wording is different.* 10.3.1.2.1 Requirements 10.3.1.2.2 Compliance
4.3.13.6 Other types	10.3.2 Non-ionizing radiation from radio frequencies in the range 0 Hz to 300 GHz These types of radiation are not covered by this standard. 10.4 Protection against acoustic energy sources *New requirements.* 10.4.1 General *New requirements.* 10.4.2 Requirements

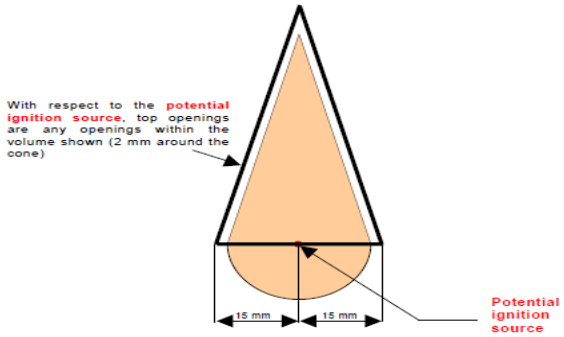
IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	New requirements 10.4.3 Protection of ordinary persons *New requirements*
4.4 Protection against hazardous moving parts *Heading only.*	8 Mechanically-caused injury *Heading only.*
4.4.1 General	8.1 General *Heading only.* 8.2 Mechanical energy source classifications *New classifications.* 8.2.1 General classification 8.2.2 MS1 8.2.3 MS2 8.2.4 MS3
No equivalent sub-clause.	8.3 Protection against mechanical energy sources
No equivalent sub-clause.	8.3.1 General
No equivalent sub-clause.	8.3.2 Protection of ordinary persons
No equivalent sub-clause.	8.3.3 Protection of instructed person

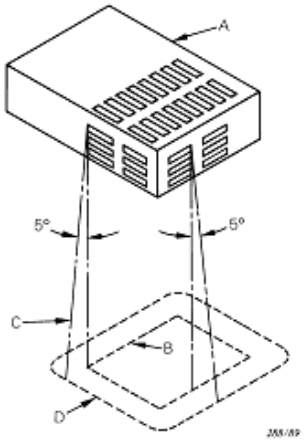
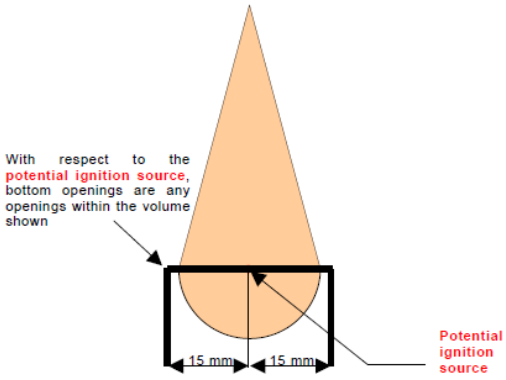
IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
4.4.2 Protection in operator access areas *For shredders, see Annex EE Amendment.1.*	8.5 Safeguards against moving parts *Requirements are similar.* 8.5.1 Requirements 8.5.2 MS2 or MS3 part required to be accessible for the function of the equipment 8.5.3 Compliance 8.5.4.2 Equipment having an electromechanical device for destruction of media 8.5.4.2.1 General requirements 8.5.4.2.2 Instructional safeguards against moving parts 8.5.4.2.3 Disconnection from the supply 8.5.4.2.4 Test method 8.5.4.2.5 Compliance
4.4.3 Protection in restricted access areas	4.3.5 Safeguards in a restricted access area *Requirements are similar.*
4.4.4 Protection in service access areas	8.3.4 Protection of skilled persons *Requirements are similar, but limited to unintentional contacts.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
4.4.5 Protection against moving fan blades 4.4.5.1 General 4.4.5.2 Protection for users 4.4.5.3 Protection for service persons	8.5 Safeguards against moving parts 8.5.1 Requirements 8.5.2 MS2 or MS3 part required o be accessible for the function of the equipment 8.5.3 Compliance *Requirements are similar.*
Refers to IEC 60950-23.	8.5.4 Special categories of equipment comprising moving parts 8.5.4.1 Large data storage equipment The requirements of IEC 60950-23 are additional to the relevant requirements in this standard. *Modifies the IEC 60950-23 requirements to use the IEC 62368-1 wording.*
4.5 Thermal requirements *Both burn hazard and high temperature requirements for insulation and other parts are specified in this sub-clause.*	9 Thermal burn injury *Heading only. (Temperature limits for insulation are specified in Clause 5.)*
4.5.1 General	*No equivalent sub-clause.*
4.5.2 Temperature tests 4.5.3 Temperature limits for materials	5.4.1.5 Maximum operating temperatures for insulating materials 5.4.1.5.1 Requirements 5.4.1.5.2 Test method 5.4.1.5.3 Compliance *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
4.5.4 Touch temperature limits *Table 4C specifies temperatures for parts of specific materials.*	9.1 General 9.2 Thermal energy source classifications 9.2.1 General 9.2.2 TS1 9.2.3 TS2 9.2.4 TS3 9.2.5 Touch temperature levels *More stringent.* *Long term touch temperature effect is introduced.* *Table 42 specifies lower temperatures for parts of specific materials.* 9.3 Protection against thermal energy sources 9.3.1 General 9.3.2 Protection of an ordinary person 9.3.2.1 Protection of an ordinary person against TS1 9.3.2.2 Protection of an ordinary person against TS2 9.3.2.3 Protection of an ordinary person against TS3 9.3.2.4 Compliance 9.3.3 Protection of an instructed person 9.3.3.1 Protection of an instructed person against TS2 9.3.3.2 Protection of an instructed person against TS3

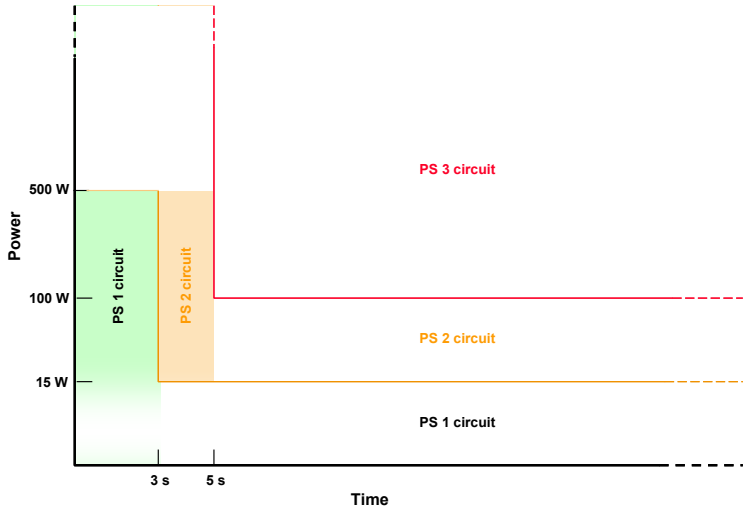
IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	9.3.4 Protection of a skilled person 9.4 Requirements for safeguards 9.4.1 Equipment safeguard 9.4.1.1 Requirements 9.4.1.2 Test method and compliance 9.4.2 Instructional safeguard
4.5.5 Resistance to abnormal heat	5.4.1.11 Thermoplastics parts on which conductive metallic parts are directly mounted 5.4.1.11.1 Requirements *Requirement is identical.* 5.4.1.11.2 Compliance 5.4.1.11.3 Ball pressure test *Acceptance of Vicat test data is new.*
4.6 Openings in enclosures *Heading only.*	6.4.8.2 Constructional requirements for a fire enclosure and a fire barrier *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent requirement.	**6.6 Likelihood of fire due to entry of foreign objects** Conductive foreign objects shall not cause bridging of PS2 circuits or PS3 circuits. Top and side openings above those circuits, located at a height of less than 1,8 m above the floor, shall comply with Annex P.
No equivalent requirement. *No requirements for top openings of fire enclosure for preventing internal fire or product of combustion passing thru the openings.*	**6.4.8.2.3 Top openings and top opening properties**  **Figure 45 - Top openings** *Requirement is New requirement. While the top openings in 6.4.8.2.3 appear similar to the requirements in 4.6 of IEC 60950-1, they are for preventing internal fire escape thru the openings and conceptually different.*
4.6.1 Top and side openings	**Annex P** **(normative)** **Safeguards against entry of foreign objects, foreign liquids, and spillage of internal liquids** *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	P.1 General This clauses specifies safeguards to reduce the likelihood of fire, electric shock, chemical reaction, and burn due to the entry of foreign metallic objects or foreign liquids through openings in the equipment, or due to spillage of internal liquids
	P.2 Safeguards against entry of solid foreign objects *Heading only.*
	P.2.1 Top and side openings *Figures are identical.*
4.6.2 Bottoms of fire enclosures 	**6.4.8.2.4 Bottom openings and bottom opening properties** *Different requirements for bottom openings.*  **Figure 46 - Bottom openings**
4.6.3 Doors or covers in fire enclosures	**6.4.8.2.5 Integrity of fire enclosure**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	Requirement is similar.
No corresponding subclause.	6.4.8.2.6 Compliance
4.6.4 Openings in transportable equipment	P.2.2 Transportable equipment **Supplementary safeguards** that reduce the likelihood of entry of foreign metallic objects include the following: openings that do not exceed 1 mm in width regardless of length; or a metal screen having a mesh with openings not greater than 2 mm between centre lines and constructed with a thread or wire diameter of not less than 0,45 mm; or internal barriers. *Requirement is similar.*
4.6.4.1 Constructional design measures	P.2.2.1 Openings in transportable equipment provided with energy storage devices, such as batteries *Requirement is similar.*
No equivalent requirement.	P.2.2.2 Transportable equipment without batteries and having accessible floating conductive parts
4.6.4.2 Evaluation measures for larger openings	*No equivalent requirement.*
4.6.4.3 Use of metallized parts	P.2.2.3 Openings in transportable equipment in relation to metallized plastic parts of a barrier or enclosure *Requirement is similar.*
4.6.5 Adhesives for constructional purposes	*No specific requirement is provided about the bonding property of the adhesive used inside of fire enclosures.*

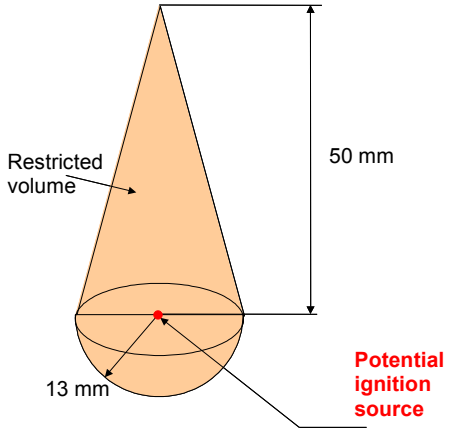
IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
4.7 Resistance to Fire This subclause specifies requirements intended to reduce the risk of ignition and the spread of flame, both within the equipment and to the outside, by the appropriate use of materials and components and by suitable construction. *Power Source classifications are not defined, though some cases of circuits are accepted as not causing ignition.* *The unit "VA" is used in IEC 60950-1 while "watt" is used in IEC 62368-1.* Metals, ceramic materials and glass shall be considered to comply without test.	**6 Electrically-caused fire** **6.1 General** **6.2 Classification of power sources (PS) and potential ignition sources (PIS)** **6.1 General** **6.2.2 Power source circuit classifications** **6.2.2.1 General** **6.2.2.2 Power measurement for worst-case load fault** **6.2.2.3 Power measurement for worst-case power source fault** **6.2.2.4 PS1** **6.2.2.5 PS2** **6.2.2.6 PS3** *New definitions (PS and PIS).*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	 **Figure 40 – Illustration of power source classification** *The definition of 3.3.4.1 combustible material provides wider coverage of material.*
Concept not defined.	**6.2.3 Classification of potential ignition sources (arcing PIS and resistive PIS)** **6.2.3.1 Arcing PIS** **6.2.3.2 Resistive PIS** *Totally new.*
4.7.1 Reducing the risk of ignition and spread of	**6.4 Safeguards against fire under single fault conditions**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
flame Two alternative methods of providing protection against ignition and spread of flame Method 1 - Selection and application of components, wiring and materials which reduce the possibility of ignition and spread of flame and, where necessary, by the use of a FIRE ENCLOSURE. Method 2 - Application of all of the simulated fault tests in 5.3.6. *Similar to Preventing Ignition method in IEC 62368-1.*	**6.4.1 General** There are two methods of providing protection... – Reduce the likelihood of ignition... – Control fire spread... *The two methods are conceptually the same as IEC 60950-1, though discussed in different order.*
No specifically stated, but conceptually same.	**6.4.2 Reduction of the likelihood of ignition under single fault conditions in PS1 circuits**
4.7.2 Conditions for a fire enclosure A FIRE ENCLOSURE is required when temperatures of parts under fault conditions could be sufficient for ignition.	**6.4.8 Fire enclosure and fire barriers** *Many different requirements.*
4.7.2.1 Parts requiring a fire enclosure	**6.4.6 Control of fire spread in PS3 circuits** **6.4.6.1 General** **6.4.6.2 Requirements** Fire spread in PS3 circuits shall be controlled as specified for PS2 circuits in 6.4.5 and by providing a **fire enclosure** as specified in 6.4.8. *Conceptually similar, but there are minor differences.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
4.7.2.2 Parts not requiring a fire enclosure *The exemptions from fire enclosure requirements such as LPS circuits in the equipment (in IEC 60950-1) are embraced in IEC 62368-1 PS2 circuit requirements.*	**6.4.4 Control of fire spread under single fault conditions in PS1 circuits** *Similar requirements.* **6.4.5 Control of fire spread under single fault conditions in PS2 circuits** **6.4.5.1 General** **6.4.5.2 Requirements** A **supplementary safeguard** is required to control the spread of fire from any possible **PIS** to other parts of the equipment as given below. **6.4.5.3 Compliance** *Major difference.*
4.7.3 Materials **4.7.3.1 General** The use of material with higher flammability classes. (VTM-0 CLASS MATERIAL, VTM-1 CLASS MATERIAL and VTM-2 CLASS MATERIAL are considered to be equivalent to V-0 CLASS MATERIAL, V-1 CLASS MATERIAL and V-2 CLASS MATERIAL, respectively, for their flammability properties.) Where it is not practical to protect components against overheating under fault conditions, the components shall be mounted on V-1 CLASS MATERIAL. Additionally, such components shall be separated from material of a class lower than V-1 CLASS MATERIAL (see 1.2.12.1, Note 2) by at least 13 mm of air, or by a solid barrier of V-1 CLASS MATERIAL. (4.7.3.1)	**4.4.2 Equivalent materials or components** Where the standard specifies a particular safeguard parameter, such as thermal class of insulation or material flammability class of a safeguard with a better parameter may be employed. NOTE For a hierarchy of the material flammability classes see Table S.1, Table S.2 and Table S.3.

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Concept not defined.	**6.4.5 Control of fire spread in PS2 circuits** *New.*
Concept not defined.	**6.4.7 Separation of combustible materials from a PIS** **6.4.7.1 General** **6.4.7.2 Separation by distance** **6.4.7.3 Separation by a fire barrier** **6.4.7.4 Compliance** *Conceptually different and new.* Combustible material, except the material on which the PIS is mounted, shall be separated from an arcing PIS or a resistive PIS. Base material of printed boards, on which an arcing PIS is located, shall be made of V-1 class material, VTM-1 class material or HF-1 class foamed material.

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	 Figure 45 - Minimum separation requirements from an arcing PIS
4.7.3.2 Materials for fire enclosures *See also :* Table 4E – Summary of material flammability requirements	6.4.8 Fire enclosure and fire barriers 6.4.8.1 Fire enclosure and fire barrier material properties 6.4.8.1.1 Requirements for a fire barrier 6.4.8.1.2 Requirements for a fire enclosure 6.4.8.1.3 Compliance 6.4.8.2 Constructional requirements for a fire enclosure and a fire barrier 6.4.8.2.1 Fire enclosure and fire barrier openings 6.4.8.2.2 Fire barrier dimensions

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	6.4.8.3 Separation of a PIS from a fire enclosure and a fire barrier *Many differences.*
4.7.3.3 Materials for components and other parts outside fire enclosures	6.4.5 Control of fire spread in PS2 circuits 6.4.6 Control of fire spread in a PS3 circuit *More stringent as HB75, HB40, and HBF materials are not accepted.*
4.7.3.4 Materials for components and other parts inside fire enclosures	6.4.6 Control of fire spread in a PS3 circuit 6.4.6.1 General 6.4.6.2 Requirements Within the **fire enclosure**, **combustible materials** that are not part of a PS2 or PS3 circuit shall comply with the flammability test of S.1 or be made of **V-2 class material**, **VTM-2 class material** or **HF-2 class foamed material (6.4.6.2)** 6.4.6.3 Compliance *Similar, but with some new requirements.*
4.7.3.5 Materials for air filter assemblies	*See 6.3.1.* *Although there is no specific statement for air filter assemblies, filter assemblies are considered to be included in general requirements for safeguards against fire. As result, the requirements may be more stringent since there is no exemption as in IEC 60950-1.*
4.7.3.6 Materials used in high-voltage components	*No equivalent requirement.*
5 Electrical requirements and simulated abnormal conditions	*No similar clause.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
5.1 Touch current and protective conductor current In this subclause measurements of current through networks simulating the impedance of the human body are referred to as measurements of TOUCH CURRENT.	*No equivalent statement.*
5.1.1 General Equipment shall be so designed and constructed that neither TOUCH CURRENT nor PROTECTIVE CONDUCTOR CURRENT is likely to create an electric shock hazard.	**5.1 General** To reduce the likelihood of painful effects and injury due to electric current passing through the human body, equipment shall be provided with the **safeguards** specified in this clause. *No equivalent statement. The principle is in Clause 5: ES1 may be accessible. At least one safeguard must be interposed between a body part and ES2. At least two safeguards must be interposed between a body part and ES3.*
5.1.2 Configuration of equipment under test (EUT)	*No equivalent heading.*
No equivalent sub-clause.	**5.7 Prospective touch voltage, touch current and protective conductor current** *Heading only.* **5.7.1 General**
5.1.2.1 Single connection to an a.c. mains supply *Refers to IEC 60990.*	**5.7.3 Equipment set-up, supply connections and earth connections** *Refers to IEC 60990.*
5.1.2.2 Redundant multiple connections to an a.c. mains supply	**5.7.3 Equipment set-up, supply connections and earth connections** *Refers to IEC 60990.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
5.1.2.3 Simultaneous multiple connections to an a.c. mains supply	**5.7.3 Equipment set-up, supply connections and earth connections** *Refers to IEC 60990.*
5.1.3 Test circuit *Test circuit does not include the neutral switches that are in IEC 60990.*	**5.7.3 Equipment set-up, supply connections and earth connections** *Test circuit figures are referenced to IEC 60990. Test circuit does not include the neutral switches that are in IEC 60990.*
5.1.4 Application of measuring instrument *Refers to figures in the text.*	**5.7.3 Equipment set-up, supply connections and earth connections** *Refers to IEC 60990 figures.* *Metal foil is not required.*
5.1.5 Test procedure	**5.7.4 Unearthed conductive accessible parts** *Heading only.* **5.7.4.1 Unearthed conductive parts accessible to ordinary persons** *Refers to specific parts of IEC 60990.*
5.1.6 Test measurements *Touch current is determined from the current, regardless of voltage.*	**5.7.4.1 Unearthed conductive parts accessible to ordinary persons** *ES1 and ES2 are determined from both the voltage and the current.*
5.1.7 Equipment with touch current exceeding 3,5 mA	*No equivalent sub-clause.*
No equivalent requirement.	**5.7.4.2 Unearthed conductive parts accessible only to**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	instructed persons
No equivalent requirement.	5.7.5 Earthed accessible conductive parts
5.1.7.1 General	5.7.6 Protective conductor current Where the **protective conductor current** exceeds the ES2 limits of Table 4, an **instructional safeguard** shall be affixed to the equipment. *The limit is ES2 (5 mA) instead of 3.5 mA.* *Does not distinguish among stationary, movable, or equipment connection (permanent or pluggable).*
5.1.7.2 Simultaneous multiple connections to the supply	5.7.3 Equipment set-up, supply connections and earth connections 5.7.6 Protective conductor current *The limit is ES2 (5 mA) instead of 3.5 mA.*
5.1.8 Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks	*No equivalent heading. No equivalent note. Telecommunication circuits are treated as "external circuits."*
5.1.8.1 Limitation of the touch current to a telecommunication network or to a cable distribution system	5.7.7 Prospective touch voltage and touch current due to external circuits *No equivalent requirement to exempt external circuits from the Touch Current measurement.* For external circuits connected to a coaxial cable, the manufacturer shall provide instructions to connect the shield of the coaxial cable to building earth in accordance with 6.2 g) and 6.2 l) of IEC 60728-11:2005.
5.1.8.2 Summation of touch currents from telecommunication networks	5.7.8 Summation of touch currents from external circuits *Equivalent requirement.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
a) EUT with earthed telecommunication ports	a) Equipment with earthed external circuit *Equivalent requirement. The limit is ES2 (5 mA) instead of 3.5 mA.*
b) EUT whose telecommunication ports have no reference to protective earth	b) Equipment whose external circuit have no reference to protective earth *Equivalent requirement. The limit is ES2 (5 mA) instead of 3.5 mA.*
5.2 Electric strength	*No equivalent heading. No equivalent note.*
5.2.1 General	5.4.4.8 Compliance Compliance with the requirements of 5.4.4.2 to 5.4.4.7 for the adequacy of **solid insulation** is verified by inspection and measurement, taking into account Annex O, by the electric strength tests of 5.4.11.1 and the additional tests required in 5.4.4.2 to 5.4.4.7, as applicable. 5.4.11 Electric strength test 5.4.11.1 Test procedure for a solid insulation type test *Equivalent requirement. No exemption for a transformer with a core or screen that is totally enclosed or encapsulated and has no electrical connection.*
5.2.2 Test procedure	5.4.11 Electric strength test 5.4.11.1 Test procedure for a solid insulation type test *D.C. voltage tests are in one polarity and then in reverse polarity.*
5.2.2 Test procedure	5.4.11.2 Test procedure for routine tests The duration of the electric strength test shall be between 1 s to 4 s.
5.3 Abnormal operating and fault conditions	*No equivalent heading.*
5.3.1 Protection against overload and abnormal	B.4 Simulated single fault conditions

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
operation	B.4.1 General *Definition of abnormal operating conditions is different. The term "single fault condition" is closer to the IEC 60950-1 term "abnormal operation."*
5.3.2 Motors	B.4.3 Motor tests B.4.3.1 Blocked motor test *Equivalent requirement.*
5.3.3 Transformers	G.7.3 Transformer overload tests G.7.3.1 Test conditions 5.5.2.4 Transformers as a basic safeguard and a supplementary safeguard *Equivalent requirement.*
5.3.4 Functional insulation	B.4.4 Short circuit of functional insulation B.4.4.1 Short circuit of clearances for functional insulation B.4.4.2 Short circuit of creepage distances for functional insulation *Equivalent requirement.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
No equivalent requirement.	**B.4.4.3 Short circuit of functional insulation on coated printed boards**
No equivalent requirement.	**B.4.5 Short circuit and interruption of electrodes in tubes and semiconductors**
5.3.5 Electromechanical components Where a hazard is likely to occur, electromechanical components other than motors are checked for compliance with 5.3.1 by applying the following conditions: – mechanical movement shall be locked in the most disadvantageous position while the component is energized normally; and – in the case of a component that is normally energized intermittently, a fault shall be simulated in the drive circuit to cause continuous energizing of the component. The duration of each test shall be as follows: – for equipment or components whose failure to operate is not evident to the OPERATOR: as long as necessary to establish steady conditions or up to the interruption of the circuit due to other consequences of the simulated fault condition, whichever is the shorter; and	*New requirement. Extensive requirements for specific components.* **G.1 Switches** **G.1.1 General** **G.1.2 Requirements for switches** **G.1.3 Test method** **G.1.4 Compliance** **G.2 Thermal cut-offs** **G.2.1 Requirements for thermal cut-offs** **G.2.2 Test method** **G.2.3 Compliance**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
– for other equipment and components: 5 min or up to interruption of the circuit due to a failure of the component (for example, burn-out) or to other consequences of the simulated fault condition, whichever	G.17 Relays G.17.1 General G.17.2 Requirements for relays G.17.3 Overload test G.17.4 Electric strength test G.17.5 Relay controlling mains socket-outlets G.17.6 Test method G.17.7 Compliance
	G.20 Mains connectors **Mains** connectors that are listed in IEC/TR 60083 or that comply with one of the following standards IEC 60309-1, IEC 60320-1, IEC 60906-1 or IEC 60906-2, are considered acceptable without further evaluation.
	G.22 Connectors other than mains connectors Connectors other than for connecting mains power shall be so designed that the plug has such a shape that insertion into a mains socket-outlet or appliance coupler is unlikely to occur.
5.3.6 Audio amplifiers in information technology equipment	E.1 Audio amplifier normal operating conditions E.2 Audio amplifier abnormal operating conditions *Equivalent requirements.*
5.3.7 Simulation of faults	6.4.3 Reduction of the likelihood of ignition under single fault conditions in PS2 circuits and PS3 circuits

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	6.4.3.1 General 6.4.3.2 Requirements 6.4.3.3 Test method 6.4.3.4 Compliance *Conceptually similar but detail requirements involved.* B.4 Simulated single fault conditions B.4.1 General *Requirements are similar.*
5.3.8 Unattended equipment	*No equivalent sub-clause.*
5.3.9 Compliance criteria for abnormal operating and fault conditions	B.4.8 Compliance during and after single fault conditions During and after a **single fault condition**, a class 1 energy source or class 2 energy source shall not become a class 3 energy source. For a class 3 energy source, during and after a **single fault condition**, at least one **safeguard** shall continue to comply with the requirements for that **safeguard**. *Compliance is based on all remaining **safeguards** being effective.*
5.3.9.1 During the tests	
5.3.9.2 After the tests	
6.Connection to telecommunication networks If the equipment is to be connected to a TELECOMMUNICATION NETWORK, the requirements of Clause 6 apply in addition to the requirements of Clauses 1 to 5 in this standard.	5.4.12 Protection against transient voltage from external circuits *Heading only.* 5.4.12.1 Requirements 5.4.12.2 Compliance and test method
6.1. Protection of telecommunication network service person, and users of other equipment connected to the network, from hazards in the equipment *Heading only.*	

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
6.1.1 Protection from hazardous voltage Circuit intended to be directly connected to a telecommunication network shall comply with SELV or TNV circuits requirements	*No requirement that a circuit connected to an external circuit, e.g., a telecommunication network, must be ES1 or ES2.* *Separation insulation must withstand any transient voltage on the external circuit.*
6.1.2 Separation of the telecommunication network from earth	*No equivalent heading.*
6.1.2.1 Requirements There shall be insulation between circuit connected to a telecommunication network and any other parts or circuitry that will be earthed Surge suppressors bridging the insulation shall have a min. rated operating voltage U_{op}	**5.4.13.2 Requirements** There shall be insulation between circuit connected to external circuits mentioned in 5.4.13.1 and any other parts or circuitry that will be earthed in some applications, either within the EUT or via other equipment.
6.1.2.2 Exclusions The requirements of 6.1.2.1 do not apply to any of the following; a) Permanently connected equipment or Pluggable equipment type B b) Equipment that is Intended to be installed by a service person and to be connected to a socket-outlet with a protective earthing connection c) Equipment that has provision for a permanently connected protective earthling conductor	**5.4.13 Separation between external circuits and earth** **5.4.13.1 General** These requirements apply only to external circuits indicated in Table 16, ID No. 11,12,13 and 14 These requirements do not apply to external circuits of; a) Permanently connected equipment b) Pluggable equipment type B c) Stationary pluggable equipment type A intended to be used in an location having equipotential bonding d) Stationary pluggable equipment type A has provision for a permanently connected protective earthling conductor.
6.2 Protection of equipment users from overvoltages on telecommunication networks *Heading only.*	**5.3.5 Safeguards between energy sources** *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
6.2.1 Separation requirements Separation between a TNV-1 circuit or TNV-3 circuit and the following parts; a) Unearthed conductive parts and non-conductive parts expected to be held or touched during normal use b) Parts and circuitry that can be touched by the test finger c) An SELV circuit, TNV-2 circuit or LIMITED current circuit	**5.3.5.1 General** Table 12 gives an overview of the required number of **equipment safeguards** between electrical energy sources. *Does not use term TNV-1 and TNV-3, but those are termed as ES1 and ES2. SELV corresponds to ES1. See Annex W Comparison of terms introduced in this standard.*
6.2.2 Electric strength test procedure *Compliance with 6.2.1 is checked by the test of either 6.2.2.1 or 6.2.2.2.*	**5.4.11 Electric strength test** **5.4.11.1 Test procedure for a solid insulation type test** Table 31 Test voltages for electric strength tests based on transient voltage *Implies that compliance is no breakdown of insulation.*
6.2.2.1 Impulse test (test voltage) for 6.2.1 a) 2.5KV for 6.2.1 b) and 6.2.1.c) 1.5KV	
6.2.2.2 Steady state test (test voltage) for 6.2.1 a) 1.5KV for 6.2.1 b) and 6.2.1.c) 1.0KV	
6.2.2.3 Compliance criteria No breakdown of insulation If a surge suppressor operates during the test for 6.2.1 a) failure for 6.2.1 b) and 6.2.1 c) permitted during the impulse test for 6.2.1 b) and 6.2.1 c) failure for electric strength test	

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
6.3 Protection of the telecommunication wiring system from overheating Equipment intended to provide power over the telecommunication wiring system to remote equipment shall limit the output current to a value that does not cause damage to the telecommunication wiring system, due to overheating, under any external load condition.	**6.5.4 Requirements for interconnection to building wiring** **6.5.5 Compliance** **Annex Q** **Q.1 Limited Power** **Q.2 Compliance and test method** *Requirements are similar, but not specific for the telecommunication wiring and apply to all interconnections to building wiring.*
7 Connection to cable distribution systems	*No equivalent heading.*
7.1 General	*The equivalent term for cable distribution system is 3.3.1.1 external circuit.*
7.2 Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment	**5.7.8 Summation of touch currents from external circuits** *Summation of touch currents shall not exceed ES2.* **5.7.7 Prospective touch voltage and touch current due to external circuits** *Similar requirement for instructions.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
7.3 Protection of equipment users from overvoltages on the cable distribution system *Equates requirements for "cable distribution system" with "telecommunication network." Refers requirements to 6.2 for separation and electric strength test. Does not require minimum clearance, creepage distance, or solid insulation.*	**5.4.2.4.3 Determination of external circuit transient voltages** This subclause specifies external circuit transient voltages for various physical configurations of the external circuit. *Clearances and electric strength test are based on the external circuit transient voltage.* **5.4.2.8 Minimum clearances based on electric strength test** Clearances for basic insulation, supplementary insulation, and reinforced insulation shall withstand an electric strength test in addition to compliance with the minimum clearance values of Table 20.
7.4 Insulation between primary circuits and cable distribution systems	*No equivalent heading.*
7.4.1 General	**5.5.4 Insulation between the mains and an external circuit consisting of a coaxial cable** *Requirements are similar.*
7.4.2 Voltage surge test	**G.14.3.2 Voltage surge test** *Requirements are similar.*
7.4.3 Impulse test	**G.14.3.3 Impulse test** *Requirements are similar.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex A **Tests for resistance to heat and fire** *Heading only.* *Refers to IEC 60695-11-3 (500 W flame test) for the equipment with total mass exceeding 18 kg and of stationary or IEC 60695-11-4 (50W flame test) for movable equipment with total mass not exceeding 18 kg.*	**Annex S** **Tests for resistance to heat and fire** *Heading only.* *Major difference.* *Annex S refers to flammability test method based on needle flame test according to IEC 60695-11-5 for the equipment where steady state power does not exceed 4,000 W and to IEC 60690-11-20 for equipment with steady state power exceeding 4,000 W.*
A.1 Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg and of stationary equipment **A.1.1 Samples** **A.1.2 Conditioning of samples** **A.1.3 Mounting of samples** **A.1.4. Test flame** **A.1.5 Test procedure** **A.1.6 Compliance criteria**	**S.5 Flammability test for fire enclosure materials of equipment with a steady-state power exceeding 4 000 W** *Requirements for circuits for higher than 4 000 W are more stringent. See 6.4.8.1.2.* Fire enclosure materials are tested according to IEC 60695-11-20:1999, using the plate procedure (see 8.3). For the purpose of this standard, the following additional requirements apply to the specified IEC 60695-11-20:1999. Clause 7 – Specimen, end product testing Subclause 8.1 – Conditioning Subclause 8.3 – Procedure – plates Subclause 8.4 – Classification

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
A.2 Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures A.2.1 Samples A.2.2 Conditioning of samples A.2.3 Mounting of samples A.2.4 Test flame A.2.5 Test procedure A.2.6 Compliance criteria	S.1 Flammability test for fire enclosure and fire barrier materials of equipment where the steady-state power does not exceed 4 000 W *Major differences (refer to Annex S).*
A.2.7 Alternative test	S.2 Flammability test for fire enclosure and fire barrier integrity *Requirements are similar.*
A.3 Hot flaming oil test A.3.1 Mounting of samples A.3.2 Test procedure A.3.3 Compliance criteria	S.3 Flammability tests for the bottom of a fire enclosure *Requirements are same.* S.3.1 Mounting of samples *Requirements are same.* S.3.2 Compliance and test method *Requirements are same.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex B Motor tests under abnormal conditions *Heading only.*	G.8 Motors *Heading only.*
B.1 General requirements	G.8.1 General requirements *With IEC 60950-1, Amendment 1, requirements are equivalent.*
B.2 Test conditions	G.8.2 Motor overload test conditions *Different heading name. Requirements are equivalent.*
B.3 Maximum temperatures	G.8.7.2 Maximum temperatures *Requirements are equivalent.*
B.4 Running overload test	G.8.3 Running overload test *Requirements are equivalent.*
B.5 Locked-rotor overload test	G.8.4 Locked-rotor overload test *Requirements are equivalent.*
B.6 Running overload test for d.c. motors in secondary circuits	G.8.5 Running overload test for d.c. motors *Heading only.*
B.6.1 General	G.8.5.1 Requirements *Requirements are similar.*
B.6.2 Test procedure	G.8.5.2 Test method

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	Different heading name. Requirements are similar.
B.6.3 Alternative test procedure	G.8.5.3 Alternative test method - the overload protection device operates, - the winding becomes an open circuit, - the load cannot be increased any further without reaching a locked rotor condition, - 7 h is reached. *Provides more test termination detail.*
B.6.4 Electric strength test	G.8.5.4 Electric strength test *Requirements are similar. ES1 replaces 42.4 volts peak or 60 volts dc.*
B.7 Locked-rotor overload test for d.c. motors in secondary circuits *Heading only.*	G.8.6 Locked-rotor overload test for d.c. motors *Heading only.*
B.7.1 General	G.8.6.1 Requirements *Different heading name. Requirements are equivalent.*
B.7.2 Test procedure	G.8.6.2 Test method *Different heading name. Requirements are equivalent. Compliance criteria are in G.8.7.*
B.7.3 Alternative test procedure	G.8.6.3 Alternative test method *Different heading name. Requirements are equivalent.*
	G.8.7 Compliance *Different heading name. Requirements are equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
B.7.4 Electric strength test	G.8.7.1 Electric strength test *Different heading name. Requirements are similar. ES1 replaces 42.4 volts peak or 60 volts dc.*
	G.8.7.2 Maximum temperature For the tests according to G.8.4 and G.8.6.2, the temperature limits as specified in Table G.3 shall not be exceeded.
B.8 Test for motors with capacitors	G.8.8 Compliance and test method for motors with capacitors *Different heading name. Requirements are equivalent.*
B.9 Test for three-phase motors	G.8.9 Compliance and test method for three-phase motors *Different heading name. Requirements are equivalent.*
B.10 Test for series motors	G.8.10 Compliance and test method for series motors *Different heading name. Requirements are equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex C (normative) Transformers C.1 Overload test	G.7 Transformers *Heading only.*
	G.7.1 General Transformers shall comply with one of the following: – meet the requirements given in G.7.2 to G.7.3; – in case of switch mode devices, meet the requirements of IEC 61204-7; – meet the requirements of IEC 61558-1 and the relevant parts of IEC 61558-2 with the following additions and limitations *Several compliance methods of transformers are provided.*
	G.7.3 Transformer overload test *Heading only.*
	G.7.3.1 Test conditions *Requirements are equivalent. Test conditions and compliance statements are in separate clauses.*
	G.7.3.2 Compliance *Requirements are equivalent. Test conditions and compliance statements are in separate clauses. New insulation classifications for 200 C and 220 C are added. The formula is in note.*
	G.7.3.3 Alternative test method *New alternative test method.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
C.2 Insulation	G.7.2 Insulation *Heading only.*
	G.7.2.1 Requirements *Requirements are equivalent.* No electric strength test applies to insulation between any winding and the core or screen, provided that the core or screen is totally enclosed or encapsulated and there is no electrical connection to the core or screen.
	G.7.2.2 Compliance criteria *Requirements are equivalent.*
Annex D: Measuring instruments for touch current tests	*No equivalent annex. The equivalent requirement is in 5.7.2.*
D.1 Measuring instrument D.2 Alternative measuring instrument	5.7.2 Measuring devices and networks *The same measuring instruments are specified, i.e. Figures 4 and 5 of IEC 60990. However the figures are not replicated in IEC 62368-1. Reference to IEC 60990 is IEC 60990: 1999.*
Annex E (normative) Temperature rise of a winding	B.1.7 Temperature measurement conditions Unless a particular method is specified, temperatures of windings shall be determined either by the thermocouple method or by any other method giving the average temperature of the winding wires such as the resistance method. *The resistance method is allowed but not described in detail.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex F Measurement of clearances and creepage distances *Heading only.*	Annex O (normative) Measurement of creepage distances and clearances *Heading only.*
Figure F.1 Narrow groove	Figure O.1 narrow groove *Requirements are equivalent.*
Figure F.2 Wide groove	Figure O.2 wide groove *Requirements are equivalent.*
Figure F.3 V-shaped groove	Figure O.3 V-shaped groove *Requirements are equivalent.*
Figure F.4 Rib	Figure O.5 Rib *Requirements are equivalent.*
Figure F.5 Uncemented jointed with narrow groove	Figure O.6 Uncemented jointed with narrow groove *Requirements are equivalent.*
Figure F.6 Uncemented jointed with wide groove	Figure O.7 Uncemented jointed with wide groove *Requirements are equivalent. (≧) in the figure of IEC 60950-1 is replaced by (>) in IEC 62368-1*
Figure F.7 Uncemented jointed with narrow and wide groove	Figure O.8 Uncemented jointed with narrow and wide groove

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	Requirements are equivalent.
Figure F.8 Narrow recess	Figure O.9 Narrow recess *Requirements are equivalent.*
Figure F.9 Wide recess	Figure O.10 Wide recess *Requirements are equivalent.*
Figure F.10 Coating around terminals	Figure O.11 Coating around terminals *Requirements are equivalent.*
Figure F.11 Coating over printed wring	Figure O.12 Coating over printed wring *Requirements are equivalent.*
Figure F.12 Measurements through openings in enclosures	Figure O.13 Example of measurements in an enclosure of insulating material *Requirements are equivalent.*
Figure F.13 Intervening, unconnected conductive part	Figure O.4 Intervening unconnected conductive part *Requirements are equivalent.*
Figure F.14 Solid insulating material	*No equivalent figure.*
Figure F.15 Thin sheet insulating material	*No equivalent figure.*
Figure F.16 Cemented joints in multi-layer printed board	Figure O.14 Cemented joints in multi-layer printed board *Requirements are equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Figure F.17 Component filled with insulating compound	**Figure O.15 Device filled with insulating compound** *Requirements are equivalent.*
Figure F.18 Partitioned bobbin	**Figure O.16 Partitioned bobbin** *Requirements are equivalent.*
No equivalent figures.	**Figure O.17 Materials with different CTI values** **Figure O.18 Materials with different CTI values having an air gap of less than X mm** **Figure O.19 Materials with different CTI values having an air groove of less than X mm** **Figure O.20 Materials with different CTI values having an air groove not smaller than X mm**
Annex G **Alternative method for determining minimum clearances** *Heading only.*	**5.4.2 Clearances** *Heading only.* *Requirements are similar.* *Additional requirements for clearances for frequencies above 30 kHz, in alignment with IEC 60664-4.* *Clearances are based on electric strength test.* *Has methods for determination of transient voltages of external circuits.*
G.1 Clearances *Heading only.*	
G.1.1 General *Prescriptive requirements for overvoltage categories.*	**5.4.2.1 General** *Clearance dimensions are based on required withstand voltage or the peak working voltage or the temporary overvoltage, whichever is highest.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
G.1.2 Summary of the procedure for determining minimum clearances To determine the minimum value for each CLEARANCE, the following steps shall be used.	**5.4.2.3 Procedure for determining minimum clearances** *Heading only.* **5.4.2.3.1 General** **5.4.2.3.2 Determination of the clearance using required withstand voltage** The clearance shall be determined using the following steps. *Includes consideration of transient voltages on d.c. mains and external circuits.*
G.2 Determination of mains transient voltage *Heading only.*	**5.4.2.4 Determination of transient voltages** *Heading only.*
G.2.1 AC mains supply	**5.4.2.4.1 Determination of a.c. mains transient voltages** *Requirements are equivalent.*
G.2.2 Earthed d.c. mains supplies **G.2.3 Unearthed d.c. mains supplies**	**5.4.2.4.2 Determination of d.c. mains transient voltages** This subclause specifies the method to determine the transient voltages from d.c. power distribution systems that need to be taken into account when determining the required withstand voltage. *The transient voltage is higher, and depends on the method of earthing the d.c. mains.*
G.2.4 Battery operation *Transient voltage is 71.*	**5.4.2.4.2 Determination of d.c. mains transient voltages** *For a battery supply, transient voltage is 0.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
G.3 Determination of telecommunication network transient voltage The effect of a telephone ringing signal is not taken into account for this purpose.	**5.4.2.4.3 Determination of external circuit transient voltages** This subclause specifies external circuit transient voltages for various physical configurations of the external circuit. *The transient voltages for various external circuits, including telecommunication circuits are given in Table 16.* A ringing or other interrupted signal shall not be taken into account if the voltage of this signal is less than that of the transient.
G.4 Determination of required withstand voltage *Heading only.*	**5.4.2.5 Determination of required withstand voltage** *Heading only.*
G.4.1 Mains transients and internal repetitive peaks	**5.4.2.5.1 Mains transient voltages** Unless 5.4.2.5.2 applies, the required withstand voltage is determined according to a), b) or c) of this subclause. *Requirements are equivalent. Does not use peak working voltage.*
No equivalent requirement.	**5.4.2.5.2 DC source transient voltages** In a circuit isolated from the mains supplied by a d.c. source with capacitive filtering, and connected to protective earth, the required withstand voltage shall be assumed to be equal to the peak value of the d.c. voltage of the source, or the peak working voltage of the circuit isolated from the mains, whichever is higher. If equipment is supplied from a dedicated battery that has no provision for charging from an external mains, the transient voltage is disregarded.
G.4.2 Transients from telecommunication networks	**5.4.2.5.3 External circuit transient voltages** *Requirements are equivalent. Has exception for insulation between mains and coaxial*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	cable external circuit. *Also:* If the transient voltage is smaller than the peak voltage of the short duration signal (such as telephone ringing), this short duration signal shall be taken into account for determination of the required withstand voltage.
G.4.3 Combination of transients	5.4.2.5.4 Combination of transient voltages *Requirements are equivalent.*
G.4.4 Transients from cable distribution systems The effect of transients from a CABLE DISTRIBUTION SYSTEM is not taken into account when determining REQUIRED WITHSTAND VOLTAGE (however, see 7.4.1).	5.4.2.4.3 Determination of external circuit transient voltages *Included in Table 16.* 5.4.2.5.3 External circuit transient voltages *The effect of transients on an external circuit is taken into account. Electric strength tests are required on some coaxial cable systems and not on others.*
G.5 Measurement of transient voltages *Heading only.*	5.4.2.6 Measurement of transient voltage levels This subclause specifies the method to measure the actual transient levels from any circuit (when the manufacturer has provided a transient suppression network). *Has a more extensive explanation on how to perform the test.*
G.6 Determination of minimum clearances For equipment to be operated up to 2 000 m above sea level, each CLEARANCE shall comply with the minimum dimensions given in Table G.2, using the value of REQUIRED WITHSTAND VOLTAGE determined according to G.4.	5.4.2.7 Determination of the minimum clearance Minimum clearances may be determined by measurement as specified in this subclause or by electric strength test in accordance with 5.4.2.8. 5.4.2.2 Compliance *More extensive conditions for measuring clearances.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Above 2 000 m above sea level, the minimum CLEARANCES shall be multiplied by the factor given in table A.2 of IEC 60664-1	**5.4.2.9 Multiplication factors for altitudes higher than 2 000 m above sea level** Table 22 – Multiplication factors for clearances and test voltages
No requirements for liquid filled components.	**G.21 Liquid filled components** *New requirement.*
Annex H **Ionizing radiation** At any point 50 mm from the surface of the OPERATOR ACCESS AREA, the dose-rate shall not exceed 36 pA/kg (5 µ Sv/h) (0,5 mR/h) (see Note 1). Account is taken of the background level.	**10.3.3 Protection of persons from ionizing radiation (X-radiation)** **10.3.3.1 General** **10.3.3.2 Requirements** **10.3.3.3 Compliance** For RS1, at any point 50 mm from the surface of the area accessible to ordinary persons and instructed persons , the dose-rate shall not exceed 36 pA/kg (5 µSv/h, or 0,5 mR/h). For RS2, for protection of a skilled person, an additional measurement is made with any part of the cabinet, case, and chassis removed per maintenance instructions (CRT exposed) at the maximum test voltage applicable and under the conditions in accordance with 10.3.3.4. At any point 100 mm from the outer surface of any component of the equipment, the dose-rate shall not exceed 185 pA/kg (25 µSv/h, or 2,5 mR/h). **10.3.3.4 Test method** *Requirements are equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex J (normative) Table of electrochemical potentials	Annex N (normative) Electrochemical potentials *Same.*
Annex K (normative) Thermal controls	G.2 Thermal cut-offs *Heading only.*
K.1 Making and breaking capacity K.2 Thermostat reliability K.3 Thermostat endurance test K.4 Temperature limiter endurance K.5 Thermal cut-out reliability K.6 Stability of operation	G.2.1 Requirements for thermal cut-offs G.2.2 Test method G.2.3 Compliance *Thermal cut-off requirements are extensively revised and include new requirements. Most requirements reference IEC 60730-1, Automatic electrical controls for household and similar use – Part 1: General requirements.*
No requirements for thermal links.	G.3 Thermal links G.3.1 Requirements for thermal links G.3.2 Compliance and test method *New requirement. Most requirements reference IEC 60691, Thermal links – requirements and application guide.*
No requirements for thermistors.	G.4 PTC thermistors *New requirement. Requirements reference IEC 60730-1, Automatic electrical controls for*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
	household and similar use – Part 1: General requirements.
Overcurrent protective devices are required by various clauses, but no requirements for the devices themselves.	**G.5 Overcurrent protective devices** Overcurrent protective devices shall comply with their applicable IEC standards.
No equivalent requirements.	**G.6 Protective devices not mentioned in Clauses G.2 to G.5** **G.6.1 Other protective devices requirements** **G.6.2 Compliance and test method**
Annex L **(normative)** **Normal load conditions for some types of electrical business equipment**	**Annex B** **(normative)** **Normal operating condition tests, abnormal operating condition tests and single fault condition tests**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
L.1 Typewriters L.2 Adding machines and cash registers L.3 Erasers L.4 Pencil sharpeners L.5 Duplicators and copy machines L.6 Motor-operated files L.7 Other business equipment	*No specific equipment reference to normal load conditions of electrical business equipment. The requirements are generalized to apply to all present and future devices covered by this standard.*
Annex M Criteria for telephone ringing signals *Heading only.*	Annex H Criteria for telephone ringing signals *Heading only.*
M.1 Introduction	H.1 General *Requirements are equivalent.*
M.2 Method A	H.2 Method A *Requirements are equivalent.*
M.3 Method B	H.3 Method B *Requirements are equivalent.*
M.3.1 Ringing signal *Heading only.*	H.3.1 Ringing signal *Heading only.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
M.3.1.1 Frequency	H.3.1.1 Frequency *Requirements are equivalent.*
M.3.1.2 Voltage	H.3.1.2 Voltage *Requirements are equivalent.*
M.3.1.3 Cadence	H.3.1.3 Cadence *Requirements are equivalent.*
M.3.1.4 Single fault current	H.3.1.4 Single fault current *Requirements are equivalent.*
M.3.2 Tripping device and monitoring voltage	H.3.2 Tripping device and monitoring voltage *Requirements are equivalent.*
M.3.2.1 Conditions for use of a tripping device or monitoring voltage	H.3.2.1 Conditions for use of a tripping device or monitoring voltage *Requirements are equivalent.*
M.3.2.2 Tripping device	H.3.2.2 Tripping device *Requirements are equivalent.*
M.3.2.3 Monitoring voltage	H.3.2.3 Monitoring voltage *Requirements are equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex N **(normative)** **Impulse test generators**	**Annex D** **(normative)** **Test generators**
N.1 ITU-T impulse test generators	**D.1 Impulse test generators** *Requirements are equivalent.*
N.2 IEC 60065 impulse test generator	**D.2 Antenna interface test generator** *Requirements are equivalent.*
No equivalent test generator.	**D.3 Electronic pulse generator**
Annex P **Normative references**	**2 Normative references** *List of IEC and ISO documents mentioned in the text.*
Annex Q **(normative)** **Voltage dependent resistors (VDRs)** A VDR used in a PRIMARY CIRCUIT shall comply with IEC 61051-2, with the following details.	**G.10 Metal Oxide Varistors** **G.10.1 General** *MOV is required to comply with IEC 61051-2. References to IEC 61052-1 are more extensive. Tested in accordance with 9.3.1 of IEC 60127-1.* **G.10.2 Basic safeguard** **G.10.3 Supplementary safeguards** **G.10.3.1 General** **G.10.3.2 Sudden failure** **G.10.3.3 Gradual failure**

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex R **(informative)** **Examples of requirements for quality control programmes** NOTE This annex gives examples of requirements for quality control programmes as specified in 2.10.6.2 for minimum separation distances for coated printed boards and in 2.10.3 and Clause G.2 for reduced CLEARANCES. **R.1 Minimum separation distances for unpopulated coated printed boards** **R.2 Reduced clearances**	*No equivalent information.*
Annex S **(informative)** **Procedure for impulse testing** **S.1 Test equipment** **S.2 Test procedure** **S.3 Examples of waveforms during impulse testing**	*No equivalent procedure.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex T **Guidance on protection against ingress of water** When the intended application is such that ingress of water is possible, an appropriate degree of protection other than IPX0 should be selected by the manufacturer from IEC 60529, an extract from which is included in this annex. Additional design features should then be included to ensure that ingress of water does not affect insulation.	**F.3.7 Equipment IP rating marking** If the equipment is intended for other than IPX0, the equipment shall bear the IP number according to the degree of protection against ingress of water in accordance with IEC 60529. If the equipment is intended for IP3X or better, the equipment shall bear the IP number according to the degree of protection against ingress of foreign objects.
Annex U **(normative)** **Insulated winding wires for use without interleaved insulation** *Heading plus unnumbered paragraph.*	**Annex J** **(normative)** **Insulated winding wires for use without interleaved insulation** *Heading only.*
	J.1 General *Same text.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
U.1 Wire construction If the wire is insulated with overlapping spirally wrapped tape, the overlap shall be adequate to ensure continued overlap during manufacture of the wound component. The overlaps shall be sufficiently secured to maintain the amount of overlap.	**G.11 Wound components** *Heading only.*
	G.11.1 Wire insulation in wound components *Heading only.*
	G.11.1.1 General c) The winding wire shall comply with Annex J. The minimum number of overlapping layers of spirally wrapped tape or extruded layers of insulation shall be as follows: – for **basic insulation**: one layer; – for **supplementary insulation**: two layers; – for **reinforced insulation**: three layers.
U.2 Type tests	**J.2 Sampling tests** *Heading only.*
	J.2.1 General *Requirements are equivalent.*
U.2.1 Electric strength	**J.2.2 Electric strength** *Requirements are equivalent.*
U.2.2 Flexibility and adherence	**J.2.3 Flexibility and adherence** *Requirements are similar. Voltages include peak.*
U.2.3 Heat shock	**J.2.4 Heat shock** *Requirements are equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
U.2.4 Retention of electric strength after bending	J.2.5 Retention of electric strength after bending *Requirements are equivalent.*
U.3 Tests during manufacture	J.3 Testing during manufacturing *Heading only.*
	J.3.1 General *Requirements are equivalent.*
U.3.1 Routine testing	J.3.2 Routine test *Requirements are equivalent.*
U.3.2 Sampling tests	J.3.3 Sampling test *Requirements are equivalent.*
Annex V (normative) AC power distribution systems V.1 Introduction V.2 TN power distribution systems V.3 TT power distribution systems V.4 IT power distribution systems	*No description of "AC power distribution systems."*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex W **(informative)** **Summation of touch currents** There are two quite different mechanisms that determine the current through a human body that touches an electronic circuit (or power bus), depending on whether or not the circuit is earthed. This distinction between earthed and unearthed (floating) circuits is not the same as between CLASS I EQUIPMENT and CLASS II EQUIPMENT. Floating circuits can exist in CLASS I EQUIPMENT and earthed circuits in CLASS II EQUIPMENT. Floating circuits are commonly, but not exclusively, used in telecommunication equipment and earthed circuits in data processing equipment, also not exclusively. **W.1 Touch current from electronic circuits** **W.1.1 Floating circuits** **W.1.2 Earthed circuits** **W.2 Interconnection of several equipments** **W.2.1 Isolation** **W.2.2 Common return, isolated from earth** **W.2.3 Common return, connected to protective earth**	*No equivalent information.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex X **(informative)** **Maximum heating effect in transformer tests** In this annex examples are given of various methods of producing this condition. Other methods are possible and compliance with Clause C.1 is not restricted to these examples. **X.1 Determination of maximum input current** **X.2 Overload test procedure**	*No description of examples that produce maximum heating in a transformer. G.7.3 covers transformer overload tests.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex Y (normative) Ultraviolet light conditioning test relative humidity of 50 % ± 5 % Y.1 Test apparatus Y.2 Mounting of test samples Y.3 Carbon-arc light-exposure apparatus Y.4 Xenon-arc light-exposure apparatus	Annex C (normative) UV radiation C.1 Protection of materials in equipment from UV radiation C.1.1 General C.2 UV light conditioning test *Humidity not specified.* C.2.1 Test apparatus C.2.2 Mounting of test samples C.2.3 Carbon-arc light-exposure test C.2.4 Xenon-arc light-exposure test *Requirements are equivalent.*
Annex Z: Overvoltage categories	Annex I Overvoltage categories (informative) Overvoltage categories (see IEC 60364-4-44) *Information is equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
Annex AA (normative) Mandrel test	5.4.4.6.5 Mandrel test *Requirements are similar.*
Annex BB Changes in the second edition (informative) BB.1 Numbering changes table BB.2 Changes to this edition	*Not applicable.*
Annex CC Evaluation of integrated circuit (IC) current limiters *Amendment 1.*	G.13 IC current limiters *Requirements are similar. One test program only.* *With Amendment 1, requirements are equivalent.*
CC.1 Integrated circuit (IC) current limiters *Has choice of either of 2 test programs.*	
CC.2 Test program 1	
CC.3 Test program 2	
Annex DD Requirements for the mounting means of rack-mounted equipment *Amendment 1.*	8.11 Mounting means of rack-mounted equipment *Requirements are equivalent.*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
DD.1 General	**8.11.1 Requirements** *Requirements are equivalent.*
DD.2 Mechanical strength test, variable N	**8.11.2 Mechanical strength test, variable N** *Requirements are equivalent.*
DD.3 Mechanical strength test, 250 N, including end stops	**8.11.3 Mechanical strength test, 250 N, including end stops** *Requirements are equivalent.*
DD.4 Compliance	**8.11.4 Compliance** *Requirements are equivalent.*
Annex EE **Household and home/office document/media shredders** *Amendment 1.*	**8.5.4.2 Equipment having an electromechanical device for destruction of media** *Heading only.*
EE.1 General HOUSEHOLD AND HOME/OFFICE DOCUMENT/MEDIA SHREDDERS shall additionally comply with the requirements of this annex.	**8.5.4.2.1 General requirements** *Requirements are similar. The requirements are generalized to apply to all present and future devices for media destruction.* *Marking is required for equipment for use in locations where children are not likely to be present (see F.4).*

IEC 60950-1 Second edition, 2005-12 and Amendment 1	IEC 62368-1 Edition 1.0, 2010-01
EE.2 Markings and instructions	8.5.4.2.2 Instructional safeguards against moving parts *Requirements are similar but not equal.*
EE.3 Inadvertent reactivation	8.5.4.2.1 General requirements 8.5.4.2.5 Compliance *Requirements are similar. Additional statement for continuous activation of safety interlock where a moving part cannot be reduced to the appropriate energy class within 2 s.*
EE.4 Disconnection of power to hazardous moving parts	8.5.4.2.3 Disconnection from the supply *Requirements are equivalent.*
EE.5 Protection against hazardous moving parts	8.5.4.2.1 General requirements 8.5.4.2.4 Test method 8.5.4.2.5 Compliance V.1.2 Test method 1 – Surfaces and openings tested with jointed test probes V.1.5 Test method 4 - Slot openings *Test requirements and test tools are the same.*