AS/NZS 60950.1:2003
(Incorporating Amendment No. 1)

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Australian/New Zealand Standard™

Information technology equipment—Safety

Part 1: General requirements (IEC 60950-1:2001, MOD)

STANDARDS Australia

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AS/NZS 60950.1:2003

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The following are represented on Committee TE-001:

Australian Chamber of Commerce and Industry
Australian Communications Authority
Australian Electrical and Electronic Manufacturers Association
Australian Information Industry Association
Consumer Electronics Association of New Zealand
Consumer Electronics Suppliers Association
Department of Defence, Australia
Electrical Compliance Testing Association
Electrical Regulatory Authorities
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Information technology equipment—Safety

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-001, *Safety of Electronic Equipment*, to supersede AS/NZS 60950:2000, *Safety of information technology equipment* from 1 July 2006. During this time it is anticipated that regulatory authorities will approve information technology equipment to either Standard.

This Standard incorporates Amendment No. 1 (May 2006). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to establish minimum safety requirements for the design, construction and operation of mains-powered or battery-powered information technology equipment. It sets out requirements intended to ensure the safety of the operator and other people who may come into contact with the equipment and, where specifically stated, for service personnel and which may be used as the basis for approval for Australia and New Zealand.

This Standard forms the first edition of AS/NZS 60950.1 *Information technology equipment—Safety* Part 1: *General requirements*.

This Standard is an adoption with national variations and contains the full text of IEC 60950-1:2001, *Information technology equipment—Safety* - Part *1: General requirements*, including Corrigendum 1 (October 2002) and has been varied as indicated to take account of Australian/New Zealand conditions.

Variations to IEC 60950-1:2001 are indicated at the appropriate places throughout this standard. Strikethrough (~~example~~) identifies IEC text, tables and figures which, for the purposes of this Australian/New Zealand Standard, are deleted. Where text, tables or figures are added, each is set in its proper place and identified by shading (example). Added figures are not themselves shaded, but are identified by a shaded border.

The variations to Clauses 6.2.2, 6.2.2.1 and 6.2.2.2 apply only in Australia and are marked by [A] in the right hand margin. For New Zealand, the text of the IEC Standard applies and is marked by [NZ] in the right hand margin.

Variations made to IEC 60950-1:2001 form the Australian/New Zealand variations for the purposes of the CB scheme for recognition of testing to standards for safety of electrical equipment. These variations have been incorporated in the body of the standard. They are listed in Annex ZZ for easy reference.

In this Standard, the following print types are used:

– requirements proper: in arial type;

– *test specifications: in italic type;*

– explanatory matter: in smaller arial type.

– terms in SMALL CAPITALS are defined in Clause 1.2.

The terms 'normative' and 'informative' are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

As this Joint Standard is reproduced from an International Standard, the following applies:

(a) The AS/NZS number is shown only on the cover and title page.

(b) The source text 'this International Standard' should read 'this Australian/New Zealand Standard', and references to 'relevant IEC Standard' should read 'relevant IEC, Australian or New Zealand Standard'.

(c) A full point should be substituted for a comma when referring to a decimal marker.

(d) References to International Standards in Annex P and Annex Q should be replaced by references to equivalent Australian or Australian/New Zealand Standards as listed. Australian or Australian/New Zealand Standards that are identical to the International Standard they replace, are appropriately identified. Where no relevant New Zealand or Australian/New Zealand Standard is listed, the referenced Australian Standard is deemed to be appropriate for the purpose in New Zealand.

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INTRODUCTION

0 Principles of safety

The following principles have been adopted by technical committee 74 in the development of this standard.

These principles do not cover performance or functional characteristics of equipment.

Words printed in **SMALL CAPITALS** are terms that are defined in 1.2 of this standard.

0.1 General principles of safety

It is essential that designers understand the underlying principles of safety requirements in order that they can engineer safe equipment.

These principles are not an alternative to the detailed requirements of this standard, but are intended to provide designers with an appreciation of the basis of these requirements. Where the equipment involves technologies and materials or methods of construction not specifically covered, the design of the equipment should provide a level of safety not less than those described in these principles of safety.

Designers shall take into account not only normal operating conditions of the equipment but also likely fault conditions, consequential faults, foreseeable misuse and external influences such as temperature, altitude, pollution, moisture, overvoltages on the mains and overvoltages on a **TELECOMMUNICATION NETWORK** or a **CABLE DISTRIBUTION SYSTEM**.

The following priorities should be observed in determining what design measures to adopt:

– where possible, specify design criteria that will eliminate, reduce or guard against hazards;

– where the above is not practicable because the functioning of the equipment would be impaired, specify the use of protective means independent of the equipment, such as personal protective equipment (which is not specified in this standard);

– where neither of the above measures is practicable, or in addition to those measures, specify the provision of markings and instructions regarding the residual risks.

There are two types of persons whose safety needs to be considered, **USERS** (or **OPERATORS**) and **SERVICE PERSONS**.

USER is the term applied to all persons other than **SERVICE PERSONS**. Requirements for protection should assume that **USERS** are not trained to identify hazards, but will not intentionally create a hazardous situation. Consequently, the requirements will provide protection for cleaners and casual visitors as well as the assigned **USERS**. In general, **USERS** should not have access to hazardous parts, and to this end, such parts should only be in **SERVICE ACCESS AREAS** or in equipment located in **RESTRICTED ACCESS LOCATIONS**.

When **USERS** are admitted to **RESTRICTED ACCESS LOCATIONS** they shall be suitably instructed.

SERVICE PERSONS are expected to use their training and skill to avoid possible injury to themselves and others due to obvious hazards which exist in **SERVICE ACCESS AREAS** of the equipment or on equipment located in **RESTRICTED ACCESS LOCATIONS**. However, **SERVICE PERSONS** should be protected against unexpected hazards. This can be done by, for example, locating parts that need to be accessible for servicing away from electrical and mechanical hazards, providing shields to avoid accidental contact with hazardous parts, and providing labels or instructions to warn personnel about any residual risk.

Information about potential hazards can be marked on the equipment or provided with the equipment, depending on the likelihood and severity of injury, or made available for SERVICE PERSONS. In general, USERS shall not be exposed to hazards likely to cause injury, and information provided for USERS should primarily aim at avoiding misuse and situations likely to create hazards, such as connection to the wrong power source and replacement of fuses by incorrect types.

MOVABLE EQUIPMENT is considered to present a slightly increased risk of shock, due to possible extra strain on the supply cord leading to rupture of the earthing conductor. With HAND-HELD EQUIPMENT, this risk is increased; wear on the cord is more likely, and further hazards could arise if the units were dropped. TRANSPORTABLE EQUIPMENT introduces a further factor because it can be used and carried in any orientation; if a small metallic object enters an opening in the ENCLOSURE it can move around inside the equipment, possibly creating a hazard.

0.2 Hazards

Application of a safety standard is intended to reduce the risk of injury or damage due to the following:

- electric shock;
- energy related hazards;
- fire;
- heat related hazards;
- mechanical hazards;
- radiation;
- chemical hazards.

0.2.1 Electric shock

Electric shock is due to current passing through the human body. The resulting physiological effects depend on the value and duration of the current and the path it takes through the body. The value of the current depends on the applied voltage, the impedance of the source and the impedance of the body. The body impedance depends in turn on the area of contact, moisture in the area of contact and the applied voltage and frequency. Currents of approximately half a milliampere can cause a reaction in persons in good health and may cause injury indirectly due to involuntary reaction. Higher currents can have more direct effects, such as burn, muscle tetanization or ventricular fibrillation.

Steady state voltages up to 42,4 V peak, or 60 V d.c., are not generally regarded as hazardous under dry conditions for an area of contact equivalent to a human hand. Bare parts which have to be touched or handled should be at earth potential or properly insulated.

Some equipment will be connected to telephone and other external networks. Some TELECOMMUNICATION NETWORKS operate with signals such as voice and ringing superimposed on a steady DC VOLTAGE; the total may exceed the values given above for steady-state voltages. It is common practice for the SERVICE PERSONS of telephone companies to handle parts of such circuits bare-handed. This has not caused serious injury, because of the use of cadenced ringing and because there are limited areas of contact with bare conductors normally handled by SERVICE PERSONS. However, the area of contact of a part accessible to the USER, and the likelihood of the part being touched, should be further limited (for example, by the shape and location of the part).

It is normal to provide two levels of protection for USERS to prevent electric shock. Therefore, the operation of equipment under normal conditions and after a single fault, including any consequential faults, should not create a shock hazard. However, provision of additional protective measures, such as protective earthing or SUPPLEMENTARY INSULATION, is not considered a substitute for, or a relief from, properly designed BASIC INSULATION.

Harm may result from:	Examples of measures to reduce risks:
Contact with bare parts normally at HAZARDOUS VOLTAGES.	Prevent USER access to parts at HAZARDOUS VOLTAGES by fixed or locked covers, SAFETY INTERLOCKS, etc. Discharge accessible capacitors that are at HAZARDOUS VOLTAGES.
Breakdown of insulation between parts normally at HAZARDOUS VOLTAGES and accessible conductive parts.	Provide BASIC INSULATION and connect the accessible conductive parts and circuits to earth so that exposure to the voltage which can develop is limited because overcurrent protection will disconnect the parts having low impedance faults within a specified time; or provide a metal screen connected to protective earth between the parts, or provide DOUBLE INSULATION or REINFORCED INSULATION between the parts, so that breakdown to the accessible part is not likely to occur.
Contact with circuits connected to TELECOMMUNICATION NETWORKS which exceed 42,4 V peak or 60 V d.c.	Limit the accessibility and area of contact of such circuits, and separate them from unearthed parts to which access is not limited.
Breakdown of USER-accessible insulation.	Insulation which is accessible to the USER should have adequate mechanical and electrical strength to reduce the likelihood of contact with HAZARDOUS VOLTAGES.
TOUCH CURRENT (leakage current) flowing from parts at HAZARDOUS VOLTAGES to accessible parts, or failure of a protective earthing connection. TOUCH CURRENT may include current due to EMC filter components connected between PRIMARY CIRCUITS and accessible parts.	Limit TOUCH CURRENT to a specified value, or provide a high integrity protective earthing connection.

0.2.2 Energy related hazards

Injury or fire may result from a short circuit between adjacent poles of high current supplies or high capacitance circuits, causing:

– burns;

– arcing;

– ejection of molten metal.

Even circuits whose voltages are safe to touch may be hazardous in this respect.

Examples of measures to reduce risks include:

– separation;

– shielding;

– provision of SAFETY INTERLOCKS.

0.2.3 Fire

Risk of fire may result from excessive temperatures either under normal operating conditions or due to overload, component failure, insulation breakdown or loose connections. Fires originating within the equipment should not spread beyond the immediate vicinity of the source of the fire, nor cause damage to the surroundings of the equipment.

Examples of measures to reduce risks include:

- providing overcurrent protection;
- using constructional materials having appropriate flammability properties for their purpose;
- selection of parts, components and consumable materials to avoid high temperature which might cause ignition;
- limiting the quantity of combustible materials used;
- shielding or separating combustible materials from likely ignition sources;
- using **ENCLOSURES** or barriers to limit the spread of fire within the equipment;
- using suitable materials for **ENCLOSURES** so as to reduce the likelihood of fire spreading from the equipment.

0.2.4 Heat related hazards

Injury may result from high temperatures under normal operating conditions, causing:

- burns due to contact with hot accessible parts;
- degradation of insulation and of safety-critical components;
- ignition of flammable liquids.

Examples of measures to reduce risks include:

- taking steps to avoid high temperature of accessible parts;
- avoiding temperatures above the ignition point of liquids;
- provision of markings to warn **USERS** where access to hot parts is unavoidable.

0.2.5 Mechanical hazards

Injury may result from:

- sharp edges and corners;
- moving parts which have the potential to cause injury;
- equipment instability;
- flying particles from imploding cathode ray tubes and exploding high pressure lamps.

Examples of measures to reduce risks include:

- rounding of sharp edges and corners;
- guarding;
- provision of **SAFETY INTERLOCKS;**
- providing sufficient stability to free-standing equipment;
- selecting cathode ray tubes and high pressure lamps that are resistant to implosion and explosion respectively;
- provision of markings to warn **USERS** where access is unavoidable.

0.2.6 Radiation

Injury to **USERS** and to **SERVICE PERSONS** may result from some forms of radiation emitted by equipment. Examples are sonic (acoustic), radio frequency, infra-red, ultraviolet and ionizing radiation, and high intensity visible and coherent light (lasers).

Examples of measures to reduce risks include:

- limiting the energy level of potential radiation sources;
- screening radiation sources;
- provision of **SAFETY INTERLOCKS**;
- provision of markings to warn **USERS** where exposure to the radiation hazard is unavoidable.

0.2.7 Chemical hazards

Injury may result from contact with some chemicals or from inhalation of their vapours and fumes.

Examples of measures to reduce risks include:

- avoiding the use of constructional and consumable materials likely to cause injury by contact or inhalation during intended and normal conditions of use;
- avoiding conditions likely to cause leakage or vaporization;
- provision of markings to warn **USERS** about the hazards.

0.3 Materials and components

Materials and components used in the construction of equipment should be so selected and arranged that they can be expected to perform in a reliable manner for the anticipated life of the equipment without creating a hazard, and would not contribute significantly to the development of a serious fire hazard. Components should be selected so that they remain within their manufacturers' ratings under normal operating conditions, and do not create a hazard under fault conditions.

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Any IEC table, figure or passage of text that is struck-through is not part of this Standard. Any Australian/New Zealand table, figure or passage of text that is added (and identified by shading) is part of this Standard.

1 General

1.1 Scope

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.

This standard is also applicable to such information technology equipment:

– designed for use as telecommunication terminal equipment and **TELECOMMUNICATION NETWORK** infrastructure equipment, regardless of the source of power;

– designed and intended to be connected directly to, or used as infrastructure equipment in, a **CABLE DISTRIBUTION SYSTEM**, regardless of the source of power;

– designed to use the **AC MAINS SUPPLY** as a communication transmission medium (see NOTE 4 of clause 6 and NOTE 3 of clause 7).

This standard specifies requirements intended to reduce risks of fire, electric shock or injury for the **OPERATOR** and layman who may come into contact with the equipment and, where specifically stated, for a **SERVICE PERSON**.

This standard is intended to reduce such risks with respect to installed equipment, whether it consists of a system of interconnected units or independent units, subject to installing, operating and maintaining the equipment in the manner prescribed by the manufacturer.