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Australian Standard 2243, Part 7—1980

SAFETY IN LABORATORIES
Part 7—ELECTRICAL ASPECTS

STANDARDS ASSOCIATION OF AUSTRALIA
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Atomic Energy Commission

Australian Institute of Petroleum Ltd

The Broken Hill Pty Co Ltd

Commonwealth Scientific and Industrial Research Organization

Department of Productivity

Department of Science and Technology

State Laboratories, Victoria

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AUSTRALIAN STANDARD

CODE OF PRACTICE FOR
SAFETY IN LABORATORIES
Part 7
ELECTRICAL ASPECTS

AS 2243, Part 7—1980

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PREFACE

This standard was prepared by the Association's Committee on Safety in Laboratories under the direction of the Chemical Standards Board. It represents the seventh part of the series on the subject of safety in laboratories, and it supplements the information given in the other parts. This standard is aimed at the provision of a sound, basic working knowledge of electrical safety in the laboratory situation and the encouragement of systematic procedures for preventing electrical accidents.

Other parts are as follows:

Part 1—General
Part 2—Chemical
Part 3—Microbiology
Part 4—Ionizing Radiations
Part 5—Non-ionizing Radiations
Part 6—Mechanical Aspects

In addition to the reference standards and publications listed in Appendix B, this standard makes reference to the following Australian standards:

AS 1076	Code of Practice for Selection, Installation and Maintenance of Electrical Apparatus and Associated Equipment for Use in Explosive Atmospheres (Other than Mining Application)
AS 1188	Code for Safety of Electronic Equipment
AS 1848	Halogenated Hydrocarbon Type Portable Fire Extinguishers
AS 1895	Code of Practice for Guarding and Safe Use of Portable Electric Tools for Domestic Use
AS 2243	Code of Practice for Safety in Laboratories Part 4—Ionizing Radiations
AS 3000	SAA Wiring Rules
AS 3160	Approval and Test Specification for Hand-held Portable Electric Tools
AS 3190	Approval and Test Specification for Current-operated (Core Balance) Earth-leakage Devices
AS 3191	Approval and Test Specification for Electric Flexible Cords
AS C100	Approval and Test Specification for Definitions and General Requirements for Electrical Materials and Equipment
AS C109	Approval and Test Specification for Appliance Plugs and Appliance Inlet-sockets
AS C112	Approval and Test Specification for Plugs and Plug Sockets
AS C126	Approval and Test Specification for Extra-low Voltage Transformers
AS C167	Approval and Test Specification for Protective Isolating Transformers
AS	Laboratory Design and Construction for Safe Working Conditions*
SAA HB 0	Report on Effects of Current Passing Through the Human Body

*In course of preparation.

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FOREWORD

Electrical safety entails safe practices, safe equipment and common sense to effectively contain occupational hazards due to electricity. Electrical accidents in the laboratory account for only a small percentage of all accidents, but they may involve serious injury.

In the event of an electric shock, it is of the utmost importance, if the victim fails to breathe and/or has lost pulse, that resuscitation be commenced immediately after rescue. Any delay may seriously reduce the chance of recovery.

To ensure that rescue and resuscitation will be quickly and competently applied, all staff who are required to work or assist on any work in the vicinity of electrical apparatus should be trained in the methods of rescue and resuscitation, and be given refresher courses at least annually.

Electrical hazards can also cause burns to the body and can start fires and explosions. These hazards can be minimized if all equipment and installations are inspected regularly by competent staff.

SECTION 1. SCOPE AND DEFINITIONS

1.1 SCOPE. This Part of the code sets out the general principles for the use of electrical equipment in general purpose laboratories to ensure the electrical safety of personnel.

The code is not intended for use in laboratories where high electrical energies are generated or used, nor is it intended to replace any legislation, statutory requirements or electricity supply authority regulations.

1.2 DEFINITIONS. For the purpose of this Part of the code, the following definitions apply:

1.2.1 Head of Laboratory—the person on whom ultimate responsibility devolves for the conduct of a laboratory (see Note.)

NOTE: Where the term 'Head of Laboratory' is used in the text it is intended to mean that the ultimate responsibility rests with the Head of Laboratory. However, in the delegation of any normal managerial processes, the person physically concerned may be a delegate of appropriate level, e.g. section head of appropriate technical expertise, or professional engineer, scientist or safety officer. As administrative appointments and terms vary from establishment to establishment the title of the actual person delegated will vary from place to place.

1.2.2 Active—any terminal or conductor of a supply system which is maintained at a difference of potential from the neutral or earthed conductor. In a system which does not include a neutral or earthed conductor, all conductors shall be considered to be active.

Alive—*see* **live.**

1.2.3 Appliance—a consuming device, other than a lamp, in which electricity is converted into heat, motion or any other form of energy, or is substantially changed in its electrical character..

1.2.4 Appliance, portable—either an appliance which is moved in operation or an appliance which can easily be moved from one place to another whilst connected to supply.

1.2.5 Approved—complying with the appropriate standard, or having the approval or acceptance of the Supply Authority, or where existing standards or Authority regulations do not apply, authorized by the Head of Laboratory.

1.2.6 Cable, flexible—a cable the conductors, insulation and covering of which are such as to afford flexibility.

1.2.7 Conductor—a wire or other form of conducting material suitable for carrying current, but not including wire or other metallic parts directly employed in converting electrical energy into another form.

1.2.8 Cord, flexible—a flexible cable, no wire of which exceeds 0.30 mm diameter and no conductor of which exceeds 4 mm^2 cross-sectional area, and having not more than five cores.

1.2.9 Equipment—any component part of an electrical installation.

1.2.10 Flexible extension cord—a length of flexible cord one end of which is terminated in a plug, and the other end in a cord-extension socket.

1.2.11 Dead—an object at or about earth potential and disconnected from any live system.

1.2.12 Earthed—connected to the general mass of earth in accordance with the appropriate requirements of AS 3000, Part 1, in such a manner as will ensure, through the operation of protective apparatus, the electrical isolation of any defective equipment.

1.2.13 Hazardous location—an area in which explosive gas/air mixtures, or dusts, or fibres or flyings are present, or may be expected to be present in quantities such as to require special precautions for the installation and use of electrical equipment.

1.2.14 Live (alive)—an object is live (alive) when a difference of potential exists, or would exist, between it and earth under normal conditions of operation. With the exception of earthing conductors and neutral busbars or links in installations where the multiple-earthed neutral system is employed, any metal connected to the neutral conductor of the supply system, even if such neutral be earthed at the source of supply, is deemed to be live in accordance with AS 3000, Part 1.

1.2.15 Outlet, general purpose (GPO)—a plug socket having a rating of 10 A, and intended for the connection of low voltage appliances or luminaires through flexible cord or cable and a plug, but not including a plug socket or cord extension socket intended solely for the connection of one particular fixed or stationary appliance or luminaires or forming part of a special purpose final subcircuit in accordance with Rule 11 of AS 3000, Part 1.

1.2.16 Plug—a device intended for insertion in a plug socket, cord-extension socket or plug-socket adaptor to make a detachable connection between the contacts of any such accessory and the conductors of a flexible core or flexible cable.

NOTE: The commercial terms 'plug top' and 'appliance plug' are covered by this definiton.

1.2.17 Cord extension socket—a device arranged for attachment to a flexible cord and having contacts whereby a detachable connection may be made with the contacts of a plug.

1.2.18 Plug socket—a device for fixing or suspension at a point and having contacts intended for making a detachable connection with the contacts of a plug. The term 'plug socket' is deemed to include a cord extension socket attached to a flexible cord which is permanently connected to fixed wiring. (*See also* outlet, general purpose).

1.2.19 Supply Authority—any person or organization engaged in the supply of electricity to the public or in the generation of electricity for supply directly or indirectly to the public, whether by virtue of any statute or any franchise agreement under any Act or otherwise.

1.2.20 Voltage—differences of potential normally existing between conductors, and between conductors and earth, as follows:

(a) *Extra-low voltage*—not exceeding 32 V alternating current or 115 V direct current.

(b) *Low voltage*—exceeding extra-low voltage, but not exceeding 250 V.

(c) *Medium voltage*—exceeding low voltage but not exceeding 650 V.

(d) *High voltage*—exceeding 650 V.