Australian Standard®

Safety in laboratories

Part 6: Mechanical aspects

This Australian Standard was prepared by Committee CH/26, Safety in laboratories. It was approved on behalf of the Council of Standards Australia on 4 January 1990 and published on 7 May 1990.

The following interests are represented on Committee CH/26:

Australian Chemical Industry Council
Australian Government Analytical Laboratories
Australian Institute of Petroleum
National Association of Testing Authority, Australia

Additional interests participating in preparation of Standard:

Australian Nuclear Science and Technology Organization
Commonwealth Scientific and Industrial Research Organization
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PREFACE

This Standard was prepared by the Standards Australia Committee on Safety in Laboratories under the direction of the Chemical Standards Board to supersede AS 2243.6—1980.

The revision was undertaken in keeping with the Standards Australia policy of revising Standards at least every five years. This edition has been expanded to include detailed information on the safeguarding of machinery and on the dangers from machinery.

Particular sections have also been expanded to include information on ventilation, principles of control of hazardous substances and operations, inventory of chemical substances, plasma cutting, cutting and welding of plastics materials, radiofrequency dielectric plastic welders, solvent welding of plastics, cryogenic liquids and hearing protection. In the preparation of this Standard cognizance was taken of the following documents:

(a) Victorian Universities and Victoria Institute of Colleges, 'Code of Safety in Workshops'.

(b) Commonwealth Scientific and Industrial Research Organization, 'Safety Handbook'

(c) The University of Leeds, 'Safety Handbook'.

(d) The University of New England, 'Safety Manual'.

(e) The University of Warwick, 'Safety in Laboratories'.

(f) Committee on Occupational Safety and Health in Commonwealth Government Employment, 'Draft Code of Practice: Laboratories (Physical and Metallurgical)'.

(g) Handbook of Compressed Gases, Compressed Gas Association Inc, Reinhold, 2nd Edition, 1981.

(h) AS 1219, Power presses—Safety requirements.

(i) AS 1470, Health and safety at work—Principles and practices

(j) AS 1473, Code of practice for the guarding and safe use of woodworking machinery

(k) AS 1485, Safety and health in workrooms of educational establishments

(l) AS 1893, Code of practice for the guarding and safe use of metal and paper cutting guillotines

This Standard is intended for use in conjunction with other Standards of the AS 2243 series and is applicable to all laboratory situations. Other parts of AS 2243 are as follows:

Part 1: General

Part 2: Chemical aspects

Part 3: Microbiology

Part 4: Ionizing radiations

Part 5: Non-ionizing radiations

Part 7: Electrical aspects

Part 8: Fume cupboards.

A further part of AS 2243 dealing with recirculating fume cabinets is in the course of preparation.

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1 SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out general principles and requirements of safe working practice relevant to mechanical operations performed in laboratories and describes the nature of the potential mechanical hazards. This Standard also covers safe working practices relevant to the use of compressed gas cylinders and cryogenic substances.

1.2 REFERENCED DOCUMENTS. A list of documents referenced in this Standard is given in Appendix A.

1.3 MINIMIZATION OF COMMON SAFETY HAZARDS.

1.3.1 General. Mechanical safety hazards are present in the use of pressure and vacuum apparatus, heating and cooling apparatus, hand and power tools, in degreasing operations, and many other aspects of daily laboratory work. Particular danger is present when gaining access to moving or otherwise hazardous parts (which are safe-guarded in normal industrial practice) of machinery to perform measurements or adjustments. Potential safety hazards associated with mechanical apparatus should be identified by displaying the appropriate warning symbols in accordance with AS 1216.1 and AS 1319.

1.3.2 Workshop training. Many laboratories have small mechanical workshops for use by people not necessarily skilled in the use of machine tools. It is essential that such people be made aware of the operating characteristics, basic safe working practices and emergency procedures relevant to the tools involved, and in particular the need for wearing appropriate protective equipment.

1.3.3 Use of machines. Mechanical apparatus shall be used only within the range of operating conditions for which it was designed. Machines with rotating components are particularly susceptible to stress because, in such apparatus, the centrifugal stresses increase as the the speed of the rotor increases.

Movement of machinery parts consists basically of rotary, sliding or reciprocating motion which, individually or in combination, can produce cutting, shearing and crushing injuries. Rotating parts are also capable of inflicting injury by personal entanglement. Dangers from machinery can be minimized by the operator wearing suitable clothing, and by fitting suitable guards, physical barriers and electrical interlocks to the machine to protect both the operator and passing traffic.

An obvious function of a machine guard is to keep the operator's body, fingers, clothing and arms away from the danger points, without impeding the intended operation of the machine, or obstructing vision. This function can usually be met by intelligent design.

Another function, which may be less obvious, is to keep hazardous objects from striking the operator. A grinding wheel guard is an example of this; a suitable guard should be of an appropriate shape and of adequate strength to contain any potential hazard.

A guard can serve a further function in preventing the fitting of an attachment likely to fail. In the case of the grinder this could be an oversize wheel, which would be more prone to disintegration. This aspect of guard functioning also applies to interlocks, where the machine cannot be started or operated unless the guard is correctly in position.

1.3.4 Temporary apparatus. Where the construction of temporary apparatus, such as supports for small loads, or small vessels for pressure or vacuum, is necessary, it is essential that apparatus design and manufacture be carried out by competent and experienced personnel.

1.3.5 Personal care. Persons wearing loose-fitting clothing, ties, jewellery including rings, and long hair (including beards) not confined close to the head by net or otherwise, shall not work with moving machinery. Sleeves of overalls or working-shirts should either be rolled up above the elbow, or be buttoned tightly at the wrist.

1.3.6 Use of personal protective equipment. Appropriate personal protective equipment for eyes, ears, face, hands, feet and respiratory system should always be available to laboratory personnel. The equipment should be comfortable to wear, and should be selected, used and maintained in accordance with SAA HB9.