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DIAGNOSTIC X-RAY FACILITIES—SAFE PRACTICES

STANDARDS ASSOCIATION OF AUSTRALIA
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Australasian College of Physical Scientists in Medicine

Australian Institute of Radiography

Confederation of Australian Industry

Department of Defence

Department of Health

Department of Health, New South Wales

Department of Health, Queensland

Department of Veterans Affairs

Diagnostic Imaging and Medical Electronics Association of Australia

Health Department, Western Australia

Public Works Department, New South Wales

Royal Australasian College of Radiologists

South Australian Health Commission

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DIAGNOSTIC X-RAY FACILITIES—SAFE PRACTICES

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PREFACE

This standard was prepared by the Association's Committee on Fixed Radiological Installations under the supervision of the Committee on Electromedical Equipment. The standard is one of a series of electromedical standards issued by the Association, covering safety matters and conditions necessary in environments where electromedical equipment is used for the purpose of diagnosis and for the treatment of patients.

This standard is intended to provide guidance to owners, operators, manufacturers and suppliers, and other persons responsible for the purchase, installation and operation of diagnostic X-ray equipment, on aspects of diagnostic radiology where decisions may be influenced by factors other than radiological safety.

The standard includes recommendations for the safe operation of radiological and auxiliary equipment, the design and layout of X-ray rooms and darkrooms and their equipment, and processing of films. It describes the influence of image receptor systems on radiation dose and the measures necessary for protection of patients and operators against unnecessary exposure to ionizing radiation.

Attention is drawn in this standard to the importance of selecting the appropriate X-ray equipment for particular procedures, the implementation of quality control and the performance checks and maintenance requirements necessary to ensure that doses received by patients are minimized.

Appendices set out appropriate methods for determining the effectiveness of safe lights, the relative efficiencies of intensifying screens and film/screen contact.

This standard does not provide a substitute for adequate training in radiographic positioning, processing, or the operation of diagnostic X-ray equipment and the implementation of safety measures; however, it draws attention to those aspects of radiological practice which have a bearing on the radiation exposure of the patient, the public, the operator of the equipment and other persons present in an X-ray department or practice.

The standard describes the precautions to be taken for reducing radiation exposure of patient and operator. It also deals with the factors outside the X-ray room which may affect radiographic quality and doses received by operator and patient. Experience has shown that an unsatisfactory radiographic result often has its origins in the darkroom and therefore particular emphasis is placed on this area.

During the preparation of this standard, reference was made to documentation published by the following organizations:

(a) International Electrotechnical Commission (IEC)

(b) International Commission on Radiological Protection (ICRP)

(c) National Health and Medical Research Council (NHMRC)

Acknowledgement is made of the assistance received from these sources.

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STANDARDS ASSOCIATION OF AUSTRALIA

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for
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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard sets out the safe practices to be implemented during the use of diagnostic X-ray equipment operating at rated voltages of 10 kV(peak) to 400 kV(peak). It provides recommendations relating to the requirements for X-ray rooms and associated X-ray equipment, to darkrooms, and to film processing procedures.

This standard also describes the recommended practices and precautions to be taken with regard to radiation exposure of patients, staff, and the public, as well as providing recommendations for the evaluation of equipment performance.

1.2 PURPOSE. The purpose of this standard is to provide guidance on the minimization of the doses received by patients and staff, having regard to—

(a) safety of X-ray equipment and rooms;

(b) safe practices in the use of diagnostic X-ray equipment;

(c) parameters to be considered in obtaining satisfactory diagnostic information at the lowest possible dose;

(d) optimum film-processing procedures; and

(e) care and maintenance of diagnostic X-ray equipment.

It should also assist health service administrators, manufacturers, suppliers of diagnostic X-ray equipment, and all other persons involved in providing diagnostic X-ray services. The standard affirms the view that this can be achieved by—

(i) establishing and maintaining a high degree of skill and training for all persons involved with the use of X-ray equipment;

(ii) restricting diagnostic examination to cases where there are clear clinical indications;

(iii) selecting the procedure appropriate to the particular diagnostic problem and employing procedures which may not require ionizing radiation;

(iv) selecting appropriate equipment and ancillary aids for the examination contemplated;

(v) use of the lowest number of exposures and the shortest possible fluoroscopic times consistent with the diagnostic problem;

(vi) careful collimation of the useful beam and the selection of exposure factors which cause the lowest possible dose to the patient while producing a radiographic image of adequate diagnostic quality;

(vii) shielding those areas of the body not relevant to the diagnostic problem particularly the gonads; and

(viii) choosing imaging facilities with characteristics which minimize doses to patients; these include X-ray films, intensifying screens, image intensifiers, and image storage systems used with intermittent or pulsed fluoroscopy.

1.3 REFERENCED DOCUMENTS. The following documents are referred to in this standard:

AS 1139	Intra-oral Dental X-ray Films
AS 1630	Sizes of Film for Medical Radiography Part 1—Films Used for Direct Exposure
AS 1680	Code of Practice for Interior Lighting and the Visual Environment
AS 2398	Fixed Diagnostic X-ray Equipment—Design, Construction and Installation—Safety Requirements
AS 2502	The Lighting of Operating Rooms
AS 3200	Approval and Test Specification—Electromedical Equipment—General Requirements
AS 3205	Approval and Test Specification—Dental and Mobile Diagnostic X-ray Equipment
IEC 627	Characteristics of Anti-scatter grids Used in X-ray Equipment
ANSI PH2.19	Conditions for Diffuse and Doubly Diffuse Transmission Measurements (Transmission Density)
BS 2606	X-ray Protective Gloves for Medical Diagnostic Purposes up to 150 kV (peak)
BS 3783	X-ray Lead-rubber Protective Aprons for Personal Use
NHMRC	Recommended Radiation Protection Standards for Individuals Exposed to Ionizing Radiation

1.4 DEFINITIONS. For the purpose of this standard, the relevant definitions of AS 2398 and AS 3200 and the following definitions apply:

1.4.1 Anti-scatter grid—a device to be placed before the image receptor area in order to reduce the incidence of scattered radiation upon that area and thus improve the contrast of the X-ray image.

1.4.2 Absorbed dose (D)—the mean energy imparted by ionizing radiation to matter. Absorbed dose is determined as the quotient of $d\bar{\varepsilon}$ by dm, where $d\bar{\varepsilon}$ is the mean energy imparted by ionizing radiation to matter of mass dm: